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JANUARY 1952

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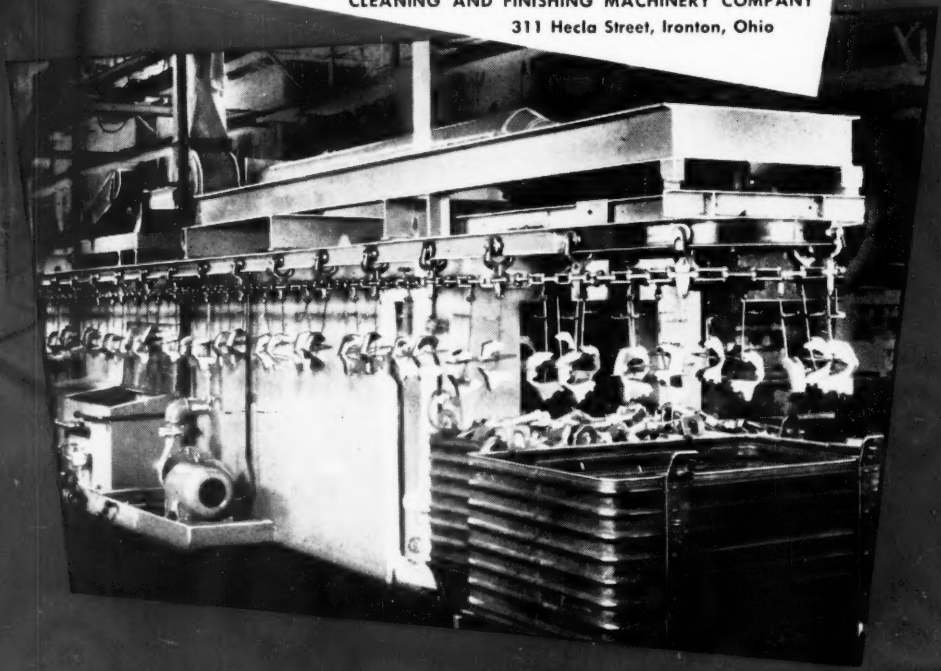

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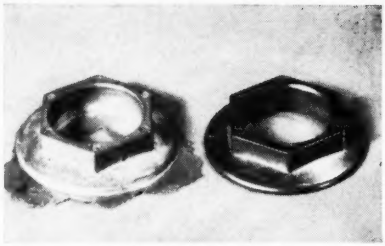

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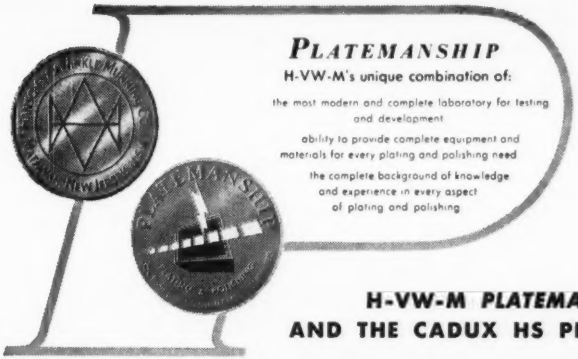
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# Products finishing

JANUARY 1952
VOLUME 16 • NUMBER 4

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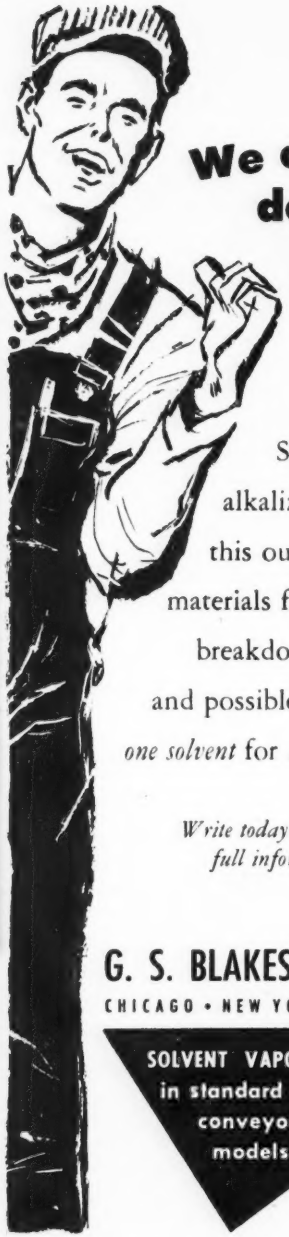

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HOT Lacquer NEWS

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# Hot-Spray Lacquer at Air-Way Speeds Normal Drying Cycle

### *Guesswork Eliminated on Cold Rainy Days*

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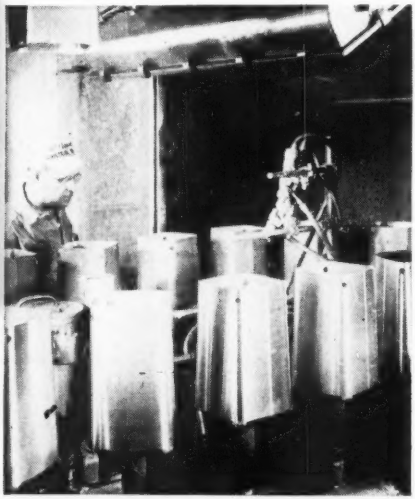
One coat of hot lacquer is now sprayed on unprimed aluminum. Then the splatter finish is effected by applying a splatter of solvent. The vacuum cleaner body then passes through a twenty-foot bank of lights and emerges tack-free, *regardless of weather.* Formerly, when cold lacquer was used, the finishing foreman had difficulty on cold, damp days because special thinners had to be formulated so that the coated vacuum cleaner would be tack-free by the end of its normal drying period.

Mr. Boyd adds that Air-Way now gets better "mileage" than formerly for same production schedule, which he attributes in part to lower atomization pressure and resultant less overspray.



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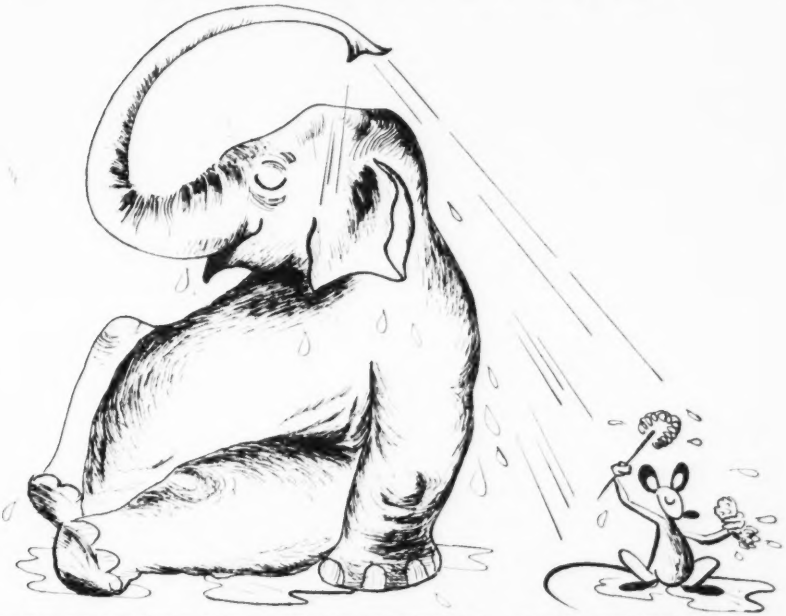

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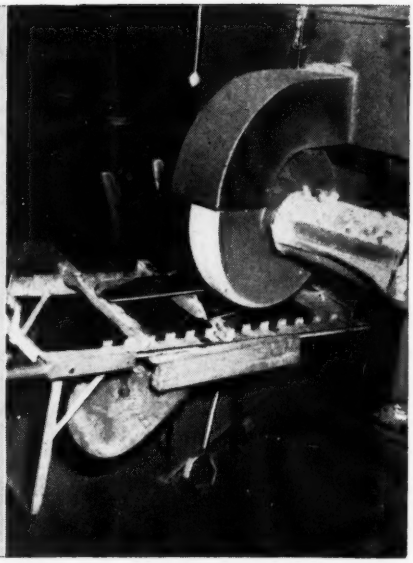

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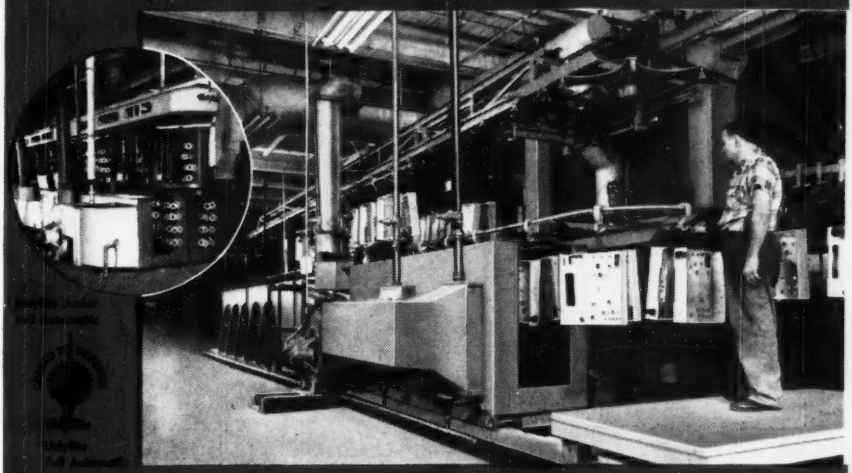

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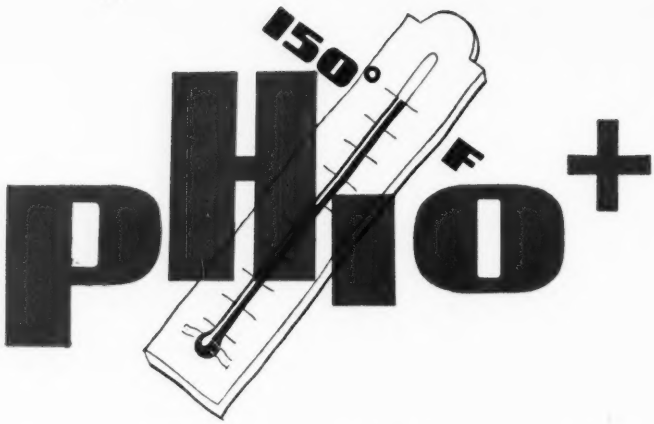


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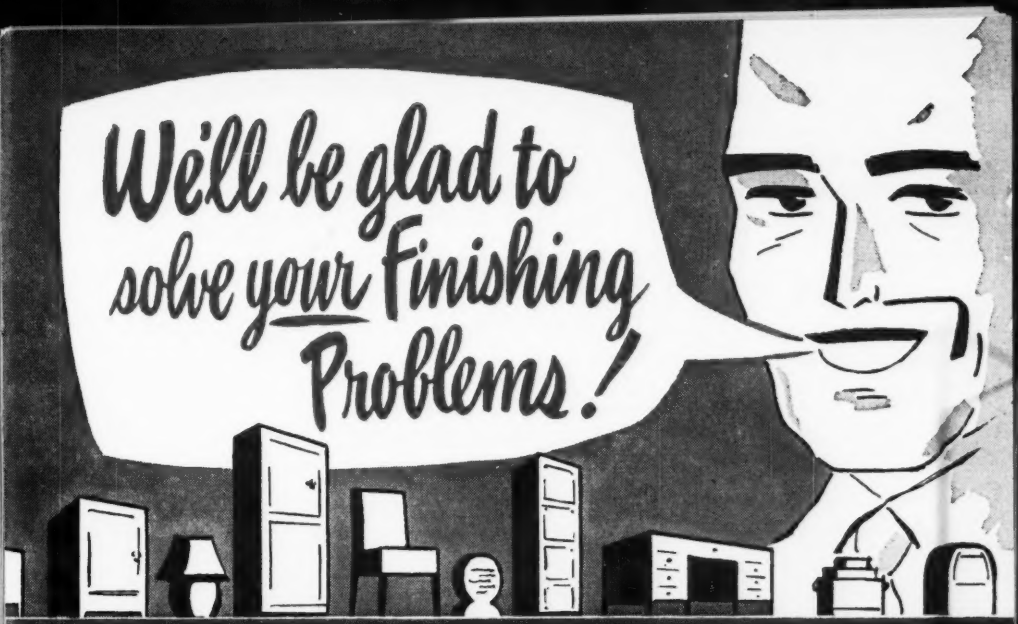


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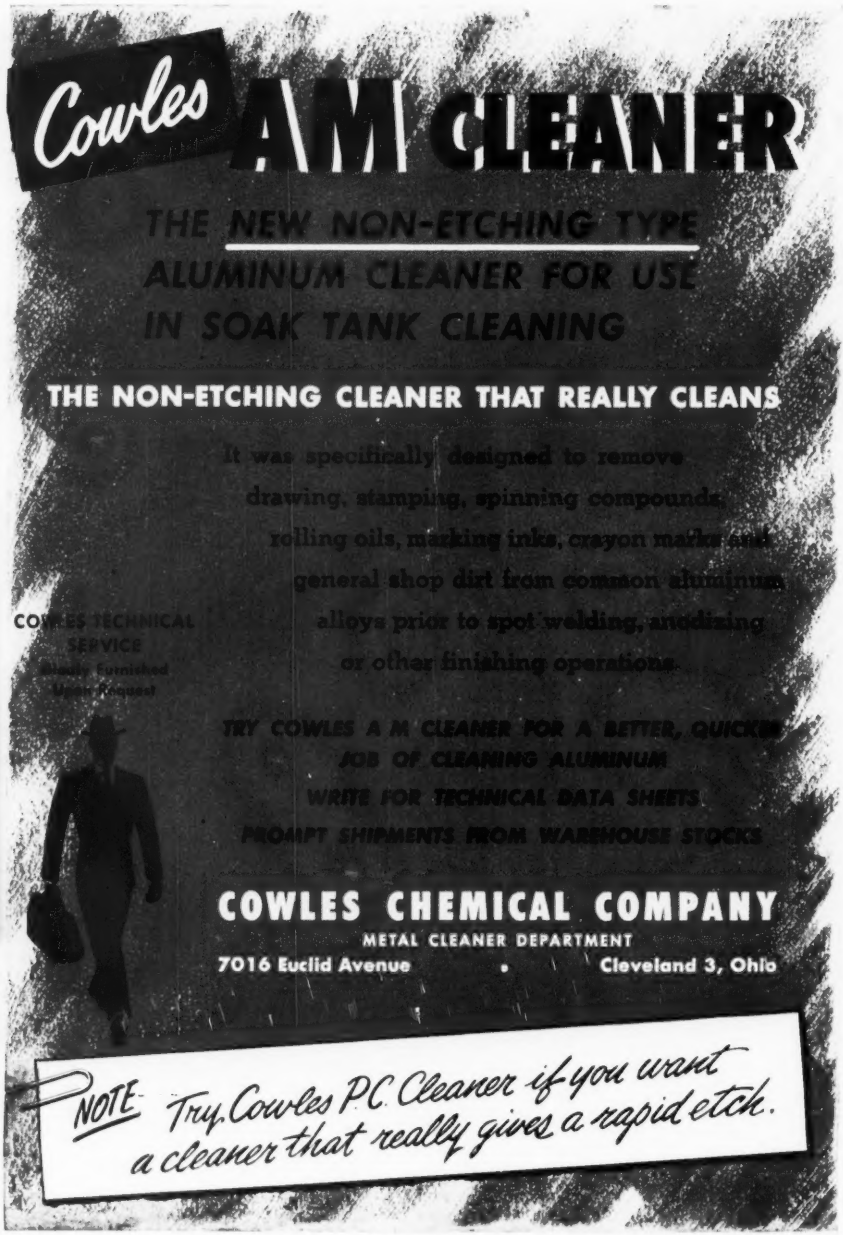
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Pf editorial

Vol. 16, No. 4

JANUARY, 1952

# Reappraisal and Research --- Keynotes For 1952

It is characteristic of American manufacturers, perhaps, to build a far better product than that justified by its service requirements. This has come about by reason of pride of craftsmanship and the necessity of producing high-quality products for a highly-competitive market.

The same pattern of thought has carried over into the establishment of specifications for products manufactured for military purposes, and, in most cases, there has been even more emphasis on perfection than was the case with regard to products for civilian use. For the field of protective finishes on metal products (already faced with shortages of metals for plating and certain raw materials for paint coatings), this problem becomes acute as military production skyrockets (Mr. Wilson recently stated that it was increasing at the rate of one billion dollars per month).

It is suggested, as a possible means of relief to our tight critical metals situation, that blind adherence and insistence on rigid coating specifications be replaced with a more open-minded attitude, and that specifications be re-examined in the light of the end use of the item. It is possible that less critical metals may be used as coating materials; a thinner finish coat may be found satisfactory; a more efficient process of application may be developed; certain substitutions of raw materials that go to make up an organic finish (for example) may be made. Any of these possibilities would offer a measure of relief to the industry and to the economy.

Research in the finishing industry will continue to make valuable contributions to the program just outlined. Research will develop new materials and application methods. The work done on conservation of plating materials by proper processing or handling of solutions, and the reduction or virtual elimination of rejects (with a corresponding saving in plated metal) will continue to show the plater how to get his job done in a more efficient, economical manner. Research, however, cannot provide the complete solution to the problems of shortages.

These comments do not recommend nor imply that U. S. products, and particularly those for the military services, shall be sub-standard. Instead they plead for what might be called a more practical evaluation of product and coating specifications.

The results of such a program cannot be realized overnight; the time to start the job is NOW.

# The Felt Wheel .... An

By WORTH COLWELL,
Committee on Information, The Felt Association

FELT wheels and buffs are coming into more general use by numerous industries in the course of manufacturing and finishing. They are often indispensable for polishing and buffing a great variety of materials in all degrees of hardness. Their use is traditional in a number of the older industries, and is being constantly expanded as new metals, alloys, plastics and other materials are being evolved and perfected. Improved methods of processing as well as new inventions and designs have offered a wider scope for the felt wheel.

Deep drawing dies, combustion chambers for automotive engines, plexiglas "blisters" on airplanes and many other parts are given the final surface finish with felt wheels. They are important finishing tools in a range of their own which falls between the soft buff and the hard stone of natural or artificial abrasive composition.

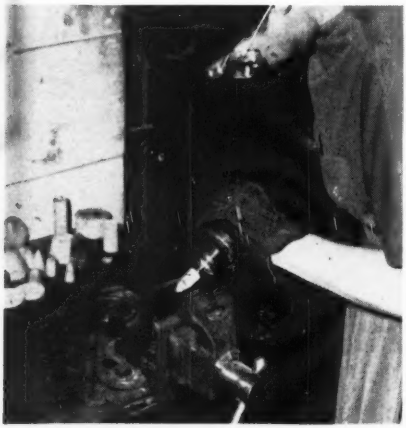


Fig. 1—Finishing the outside of a connecting rod with felt cone turned to fit contour of work.

The function of the felt wheel in surface finishing is intermediate between those of the emery polishing wheel or belt and the buffing wheel, because felt is a solid substance having marked natural resilience. It is easily adaptable to any given requirement by a choice of abrasives. The latitude of its employment is further widened by its production in different degrees of density, connoting both firmness and resilience.

It may be used in the natural state, or as an applicator for liquid dispersions of suitable polishing agents. A more common usage of the wheel is setting it up with abrasives suited to the character and quantity of material to be removed by the particular surface treatment that is in view.

The "heading" or setting up of the felt wheel with a fixed abrasive coating is accomplished by impregnating

# Important Finishing Tool

the circumference with glue or resins and then rolling it in the abrasive to bond the grains to the surface. When this treatment is properly carried out, the grits are firmly embedded in the matrix but protrude sufficiently to perform the proper cutting action.

For some purposes "grease wheels" are used. These are set-up wheels in which the action of the abrasive is moderated by the application to the grained surface of grease, tripoli or other compounds. "Greaseless wheels" are also sometimes used. These are wheels having a greaseless compound containing the abrasive applied directly to the surface. Belt polishing provides quite an extensive use for felt contact wheels.

Successful use of felt wheels depends first of all upon the selection of wheels of uniform texture and of suitable density, fabricated from the best quality wools; second, on a correct choice of abrasives; and finally, upon exercise of the utmost care in setting up the wheels. The user works out the application as a part of his manufacturing technique. The felt industry produces the untreated wheels, bored and turned to size, ready for mounting.

**Manufacture**

Felt wheels may consist of discs cut from sheet felt, or they may be individually formed and fabricated. "Scratch wheels," used in removing blemishes from plate and mirror glass, have squared strips of sheet felt applied tirewise to the circumference of a wooden wheel. Felt "bobs," or specially shaped polishing tools, ⅛ to five inches in diameter, unmounted or mounted on arbors for use with flexible

Fig. 2—Finishing gear teeth with knife edge wool felt wheel

shafts, are turned down from cylinders or cut from sheet felt. Exceptionally wide felt wheels and rolls are formed by laminating as many felt discs as necessary to obtain the required face.

Formed felt wheels are manufactured by the same general method as sheet felts. Selected wools, or wool and other tough animal fibers such as goat hair, are carded into soft batts. These batts are cut into circular laminations and piled to accumulate a stated weight. Each set is then compressed and confined in a burlap envelope during the initial felting or "hardening" operation. The oversize mats thus produced are consolidated by "fulling" till the required density has been attained.

"Hardening" consists in agitating the batts under pressure while in a warm, moist and slightly acidulated condition, to induce the individual fibers to worm their way into close entanglement, thus forming a loosely integrated mat of uniform texture.

"Fulling" consists in shrinking the hardened blank by persistent tumbling and pounding in a hammer mill. This increases the density to the point of solidification simply by impact, which

**TABLE I**

REPRESENTATIVE WEIGHTS OF FLAT WHEELS FOR GENERAL PRACTICE

| Diameter In. | WIDTH OF FACE—INCHES | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | 1¼ | | 1½ | | 2 | | 2½ | | 3 | |
| | Lbs. | Oz. | Lbs. | Oz. | Lbs. | Oz. | Lbs. | Oz. | Lbs. | Oz. | Lbs. | Oz. |
| **SOFT** | | | | | | | | | | | | |
| 6 | 0 | 8 | 0 | 10 | 0 | 12 | 1 | 0 | 1 | 4 | 1 | 8 |
| 10 | 1 | 7 | 1 | 12 | 2 | 2 | 2 | 13 | 3 | 8 | 4 | 4 |
| 14 | 2 | 12 | 3 | 7 | 4 | 3 | 5 | 9 | 6 | 15 | 8 | 5 |
| 18 | 4 | 9 | 5 | 12 | 6 | 14 | 9 | 3 | 11 | 7 | 13 | 12 |
| 20 | 5 | 11 | 7 | 1 | 8 | 7 | 11 | 5 | 14 | 2 | 17 | 1 |
| 24 | 8 | 2 | 10 | 3 | 12 | 3 | 16 | 4 | 20 | 6 | 24 | 7 |
| **MEDIUM** | | | | | | | | | | | | |
| 6 | 0 | 10 | 0 | 12 | 0 | 15 | 1 | 4 | 1 | 9 | 1 | 14 |
| 10 | 1 | 11 | 2 | 3 | 2 | 9 | 3 | 7 | 4 | 4 | 5 | 2 |
| 14 | 3 | 6 | 4 | 3 | 5 | 1 | 6 | 12 | 8 | 5 | 10 | 1 |
| 18 | 5 | 5 | 6 | 11 | 8 | 0 | 10 | 11 | 13 | 4 | 16 | 1 |
| 20 | 6 | 13 | 8 | 9 | 10 | 4 | 13 | 11 | 17 | 2 | 20 | 9 |
| 24 | 9 | 8 | 11 | 14 | 16 | 10 | 21 | 6 | 26 | 2 | 28 | 8 |
| **HARD** | | | | | | | | | | | | |
| 6 | 0 | 11 | 0 | 14 | 1 | 1 | 1 | 7 | 1 | 12 | 2 | 2 |
| 10 | 1 | 15 | 2 | 7 | 2 | 15 | 3 | 15 | 4 | 14 | 5 | 14 |
| 14 | 3 | 13 | 4 | 13 | 5 | 12 | 7 | 11 | 9 | 10 | 11 | 9 |
| 18 | 6 | 6 | 7 | 15 | 9 | 9 | 12 | 12 | 15 | 15 | 19 | 1 |
| 20 | 7 | 14 | 9 | 13 | 11 | 12 | 15 | 11 | 19 | 10 | 23 | 9 |
| 24 | 11 | 5 | 14 | 2 | 16 | 15 | 22 | 10 | 28 | 4 | 33 | 15 |
| **ROCK HARD** | | | | | | | | | | | | |
| 6 | 0 | 13 | 1 | 0 | 1 | 3 | 1 | 10 | 2 | 1 | 2 | 7 |
| 10 | 2 | 4 | 2 | 13 | 3 | 6 | 4 | 8 | 5 | 10 | 6 | 12 |
| 14 | 4 | 7 | 5 | 9 | 6 | 10 | 8 | 14 | 11 | 1 | 13 | 5 |
| 18 | 7 | 6 | 9 | 4 | 11 | 1 | 14 | 12 | 18 | 7 | 22 | 3 |
| 20 | 9 | 1 | 11 | 4 | 13 | 9 | 18 | 1 | 22 | 9 | 27 | 2 |
| 24 | 13 | 3 | 16 | 6 | 19 | 11 | 26 | 4 | 32 | 13 | 39 | 6 |

drives the fibers closer together. Adhesives are never used in fabricating felt wheels.

After being fulled, the wheels are straightened, neutralized, dried, seasoned, and then hot pressed to the desired thickness. They are then bored, turned to diameter, trued and balanced.

Felt wheels are customarily fabricated in four densities, or degrees of hardness, known to the trade as "Soft," "Medium," "Hard," and "Rock Hard." They are made in even inch diameters from 6 to 24 inches; in width of face, or thickness, from ⅛ to 1 inch by eighths and from 1 to 4 inches by quarters. Wheels of 3½ and 4-inch face are also regularly listed. Solid wheels up to 6-inch face are available on special order.

Manufacturing practice tends to hold felt wheel densities to substantially the same weight per cubic inch throughout the range in each nominal density. This assures consistent performance, independent of the size of the wheel, throughout the range.

Average densities computed from the catalog weights of a number of manufacturers show the typical scale of "hardness" for the industry to be: soft wheels, 0.288 ounce per cubic inch; medium wheels, 0.366 ounce per cubic inch; hard wheels, 0.400 ounce per cubic inch; rock hard wheels, 0.464 ounce per cubic inch. Representative wheel weights calculated from these averages are shown in Table 1 for the full range up to 24-inch diameter and 3-inch face. The tabulated values in general approximate the weights listed by the individual manufacturers.

### Applications

Because the purpose and mechanics of each polishing or finishing operation determines the selection and method of applying the abrasive, as well as the selection of the wheel, any list of felt wheel applications must fall short of complete authority in pointing up new uses for such wheels. Nevertheless, the following abbreviated notation of common applications should have illustrative value:

Fig. 3—Wool felt "bobs," shaped to suit the desired contour, are used with flexible shaft drive in forming concave surfaces. (Illinois Metal Co., Cairo, Ill.)
*(All photos courtesy The Felt Association, New York 17, N. Y.)*

1. Soft felt wheels are commonly used for polishing tin, aluminum, soft brass and glass; exemplified by die castings, instrument hands, jewelry, marble and granite.
2. Medium felt wheels are commonly used for general polishing purposes, especially on articles of brass, bronze, copper and cast iron; that is, jewelry and hardware, for example.
3. Hard felt wheels are commonly used for polishing ornamental iron and cut stones, for imparting a high polish to various surfaces before plating; such as tools and implements.
4. Rock hard felt wheels are commonly used for polishing sheet steel, steel forgings and lapping steel parts; notably in finishing steel dies, tools and gems.

# Finishing Clinic

In this department are presented some of the questions submitted by readers together with suggested solutions of the problems outlined.

**Question.** *We would like to know if you can help us on a finishing problem concerning our washer-extractor. We are at present coating our 36-inch diameter by 36-inch deep baskets and our 42-inch tubs by a hot dip galvanizing method but find that the galvanize does not resist the mild alkalies and mild acids used in normal laundry procedure.*

*We have been considering the use of a plastisol coating over a proper type primer on our ordinary steel baskets and tubs. The baskets and tubs, of course, will be properly cleaned first and the coating will be baked. We are also considering the use of stainless steel metallizing or spraying of our baskets and tubs with a new gun which gives 20 to 30 per cent greater adhesion.*

*In addition to the two above thoughts that we have, there are undoubtedly other processes which might be used satisfactorily. Can you suggest any that you believe would be superior to the above two?*

***H. V. D'A.***

**Answer.** You are certainly proceeding along the proper lines to consider the possibility of a baked plastic coating or a stainless steel metallized coating. You will soon discover which method presents the best solution to your problem from the standpoint of service results experienced and process costs. At the moment we are unable to suggest other types of coatings which might prove useful to you in view of the current Government regulations restricting many uses of strategic metals.

Another process that might offer possibilities is that of zinc plating the steel baskets and tubs, followed by a

surface conversion treatment, then a baked paint coating having the proper characteristics for use in mild alkalies and mild acids. Should the plastisol coating prove unsatisfactory from a service standpoint and the stainless steel metallizing prove too expensive, then you might like to consider the possibility of zinc plating followed by a surface conversion treatment.

*fc*

**Question.** *We are particularly interested in the imitation silver, nickel, or chromium finish used on the plastic toy dish enclosed. We would appreciate your advice regarding the process and information concerning suppliers of the material.*

*L. L. G.*

**Answer.** Although it is rather difficult to determine in what manner this coating was applied, it seems likely that it was applied in one of three ways:

1. By coating the plastic surface with a conducting material and then electroplating the metal onto the plastic object. For details about this process we should like to refer you to Dr. Harold A. Narcus, Electrochemical Industries, Worcester, Massachusetts, and also to Metaplast Process, Inc., 9-13 37th Avenue, Long Island City 1, New York.

2. The coating may be applied by the vacuum vapor process or "sputtering" process. We are enclosing tear sheets from a previous issue of PRODUCTS FINISHING in which this process was described and in which several manufacturers of the equipment necessary are listed.

3. The coating may be a metallic lacquer sprayed on and baked, as you suggest in your letter. For information regarding paint finishes we should like to refer you to the following companies (six companies listed).

*fc*

**Question.** *We should like to procure a formula for the making of a silver powder material to be used in the field for silver plating electrical copper objects of small areas which would not require any electricity in its application.*

*E. S. G.*

**Answer.** In "The Chemical Formulary" by H. Bennett (Chemical Publishing Co., Inc., Brooklyn, N. Y.) the following formula is listed:

| | |
|---|---|
| Silver nitrate | 25 parts |
| Ammonium chloride | 11 parts |
| Sodium thiosulphate | 25 parts |
| Whiting | 225 parts |
| Tartaric acid | 13 parts |
| Water | 480 parts |

These chemicals are of course dissolved in the suggested amount of water, the solution is shaken thoroughly before using, and then rubbed on the articles to be silver plated. A thin film of silver will be deposited on copper and brass articles.

Of course, such a film is very thin and is of questionable stability and continuity. As you are probably aware, the commercially accepted method of silver plating electrical terminals is to use the conventional electroplating methods and deposit a fairly heavy coat of silver. Electrical terminals so plated give excellent service and offer many advantages not found in plain copper terminals.

**DO YOU HAVE A FINISHING PROBLEM?**

The editorial staff of PRODUCTS FINISHING is prepared to aid you in the solution of your problem.
There is no charge for this service.

# New Trends in the Chemistry of Barrel Finishing

By WILLIAM E. BRANDT

Director of Research and Development
Blue Magic Chemical Specialties Company

TUMBLING as a means of finishing metal parts is a process of long standing in the metal-working industry but prior to the advent of modern media, precision barrel finishing was unknown. Methods of deburring and finishing with the old media generally gave slow, costly, and unsatisfactory results. Burrs were not actually removed but merely peened over, and to a large extent, surface imperfections remained on the work.

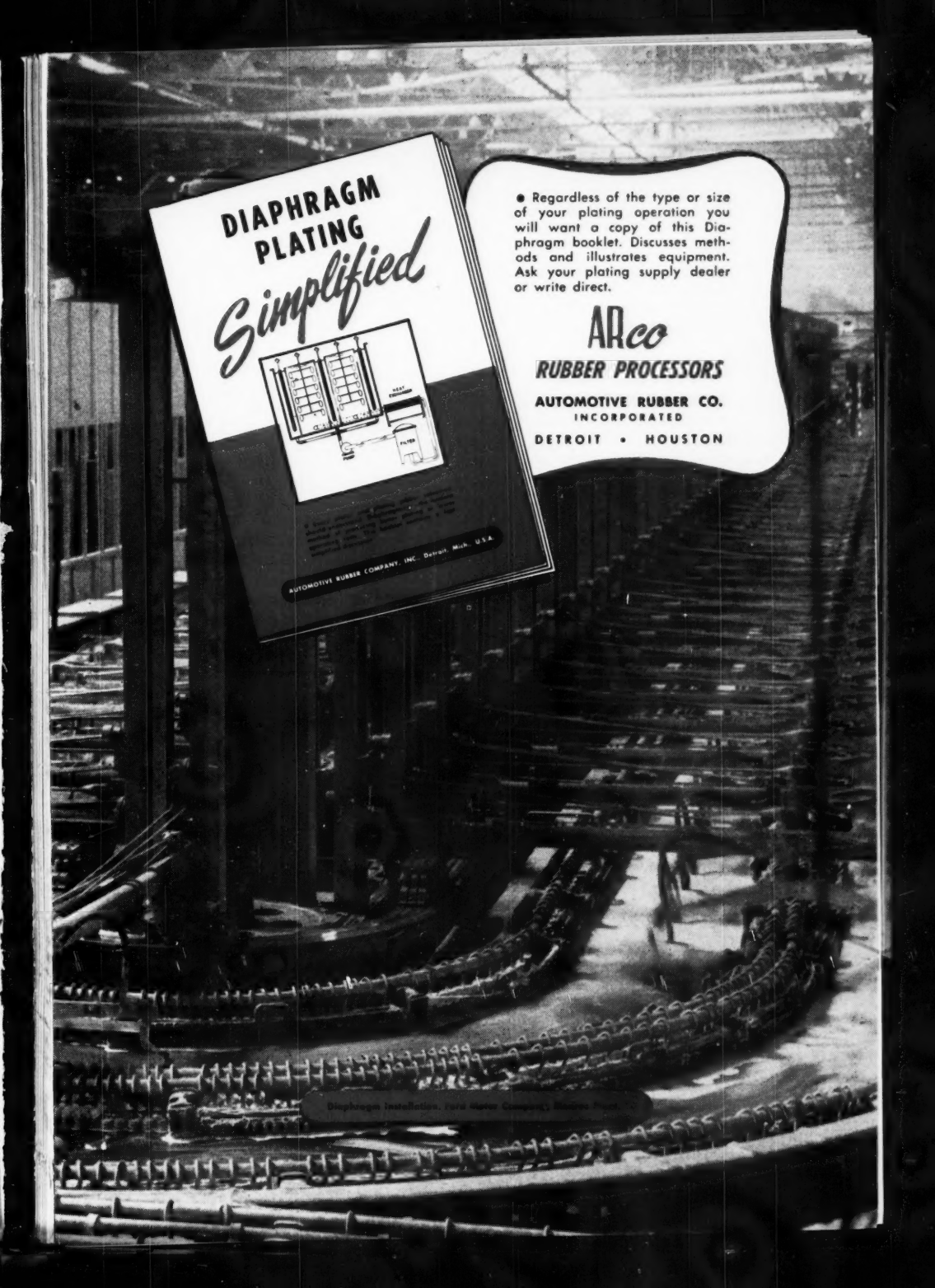
While modern media made high precision work possible, thereby securing uniform radii and meeting blue print specifications, it is the new chemical cleaners employed with the media which now enable the manufacturer to actually remove metal in greatly reduced time cycles, to obtain true metal color, to eliminate surface imperfections and to tumble parts which previously could not be tumbled. New chemical compounds now aid in producing barrel finishes which are not readily distinguished from hand buffed finishes. With increasing awareness, the metal-working industry is witnessing superior results at often great economies in time and manpower.

Choice of the proper chemical compound for a given barrel finishing operation is all-important. The ideal all-purpose compound which will give top results in any operation on all metals is, per se, a Utopian dream. The particular tumbling operation as well as the characteristics of the metal or alloy of the work processed, the work itself and, to some extent, the equipment used, will dictate the type of chemical to be employed.

As a general rule, the manufacturer or processor of metal parts will look for a compound which he can buy in as concentrated a form as possible and which he can employ in as many different operations as possible. To meet such demands new compounds have been and are being tailor-made for the barrel finishing trade.

In selecting a cleaner the choice will be for an acid, neutral or alkaline composition, depending on the purpose of the operation and on the particular metal processed. The acidity (or alkalinity) of a solution is expressed in terms of hydrogen ion concentration. It is, morever, the concentration of dissociated or ionized hydrogen (or hydroxyl) which determines the actual or practical acidity or alkalinity of a given solution. The quantity of ionized hydrogen present in a solution is referred to as the hydrogen ion concentration of that solution. This is usually expressed in terms of pH. Pure, distilled water is neutral and contains 0.0000001 gm. of ionized hydrogen per liter, that is $10^{-7}$ gram. This fraction of ionized hydrogen is simply expressed by the symbol pH 7; pH 7 being the point of neutrality and any pH below 7 being acid, any pH above 7 being alkaline.

In many of the ordinary alkaline and phosphate formulated cleaners, given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pH values came to be associated with use and performance. Thus for instance, tables were suggested listing certain pH ranges for given metals and operations. Yet, it is a well known fact that both acids and alkalies attack metals. For this very reason the new trend in the chemistry of barrel finishing compounds is definitely toward more neutral compounds. In this connection, therefore, dogmatic adherence to certain pH values must be discouraged. We do not mean to say that pH values are unimportant in the new compounds. To the contrary, the more neutral a cleaner the more sensitive it often is to even the slightest adjustment of its natural pH by the customary methods.

The importance of detergency, maximum rinsibility, coloring and uniformity cannot be overemphasized. Even the novice in barrel finishing soon learns the absolute necessity for these factors, especially with work which is to be plated or lacquered. In the newer compounds, these all-important features are largely built with synthetic detergent and wetting agent combinations. Such combinations are frequently outstanding for their remarkable effectiveness. Because of the great number of synthetics on the market today, the compounding of proper cleaners requires well nigh expert knowledge of the field. Very slight differences in natural pH values can result in totally unsatisfactory work, while adjusting of pH in the conventional manner may easily bring disastrous results.

The difficulty of arriving at the proper pH value in the finished product is often as severe a problem as finding the proper combination and the exact amount of synthetic to be used. It is surprising how senstitive even steel can be to slight adjustments in pH by the conventional methods. Similarly, improperly selected synthetics or improper amounts of the right detergent can


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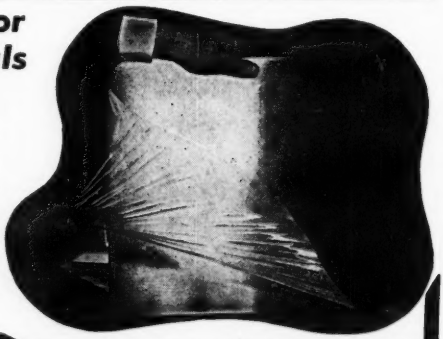

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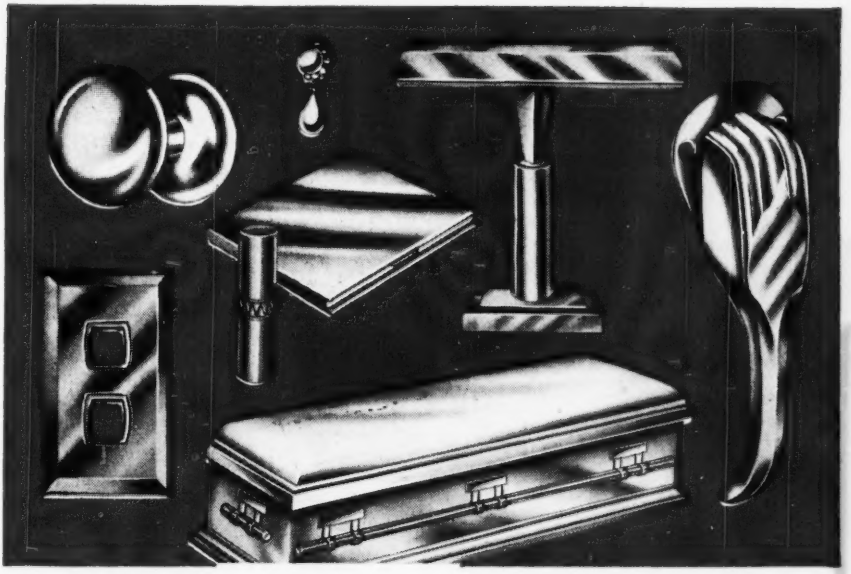
Among many advantages, it is nontoxic, possesses great tensile strength and is easily stripped off in one piece. Write for complete information on this new strippable plastic.



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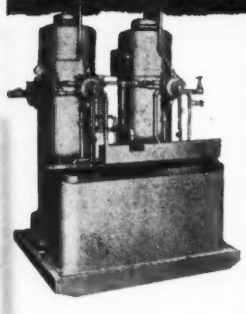

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**Nickel Dip Solutions**
**Neutralizer Solutions**

Cost analyses are proving that the use of raw water in metal coating processes is not so cheap after all. This is especially true when mineral-free water can be obtained for a matter of cents per 1000 gallons in any quality with an INDUSTRIAL water demineralizer.

The operation is very simple. Raw water is passed through alternate beds of ion-exchange resins, and it comes out free of all mineral salts. No steam, heat, still, or cooling water is needed—keeping space requirements at a minimum.

It's simple to get the complete facts for your case. Send us a water analysis and let us know how much water you have to treat and the gallons per hour needed. We can then give you the whole demineralizer story including estimated costs, equipment required, performance data, etc., for your requirements.

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change results to a great extent, especially on ferrous metals, aluminum and various die cast alloys. These statements hold true with reference to roughing, finishing, or burnishing.

For sensitive metals, it often makes a great deal of difference whether or not the source of the active raw materials is of organic origin. Free fatty acid content is an important factor. Once a cleaner has been properly built with synthetics, it will usually yield superior results, have a longer life, enjoy a wider range of application, and reduce considerably the time cycles necessary to bring these results about. In addition to these advantages, the highly concentrated form of the new compounds—fillers being omitted—make for greater ease of storage and handling. Shipping advantages also are obvious. New chemicals for barrel finishing are available in liquid, paste, jelly, and non-dusting powder form.

It may be of interest to note that lubrication or cushioning requirements are also built into the new compounds with synthetics. Again, in this connection older conceptions are giving way to quite drastic innovations. It has been considered orthodox procedure in barrel finishing to have little or no lubrication and low water level during the roughing operation and considerable lubrication and high water level for finishing and burnishing. The new compounds will sometimes bring startling results when very considerable cushioning is employed at a very low water level for both the roughing and finishing operations.

We mentioned previously that the newer compounds often cover a wider range of application. Thus a product is available which will clean and degrease, deburr, color, and finish brass, bronze, copper, silver or gold, all in one operation. When this compound is used for deburring only of the metals mentioned, a fraction of the amount recommended for the finishing operation will

AMERICAN CHEMICAL PAINT COMPANY
AMBLER CHEMICALS ACP PROCESSES PENNA.

# Technical Service Data Sheet

## Subject: METAL PRESERVATION AND PAINT PROTECTION WITH ACP PHOSPHATE COATING CHEMICALS

**Ordnance products are now given a protective phosphate coating for extra durability under all kinds of severe exposure conditions. Both military and civilian applications of ACP phosphate coating chemicals are shown in the chart below.**

SELECTION CHART OF ACP PROTECTIVE COATING CHEMICALS FOR STEEL, ZINC, AND ALUMINUM

| METAL | ACP CHEMICAL | OBJECT OF COATING | TYPICAL METAL PRODUCTS TREATED | GOVERNMENT SPECIFICATIONS |
|---|---|---|---|---|
| STEEL | "GRANODINE" Zinc Phosphate Coating Chemical | Improved paint adhesion | Steel, iron, or zinc fabricated units or components, automobile bodies, refrigerators, washing machines, cabinets, etc., projectiles, rockets, bombs, rifles, small arms, belt links, cartridge tanks, vehicular sheet metal, tank bolts and links, recoilless guns, etc. | MIL-S-5002<br>JAN-C-490, Grade 1<br>JAN-F-495<br>U.S.A. 57-0-2, Type II, Class C<br>U.S.A. 51-70-1, Finish 22.02, Class C<br>U.S.A. 50-60-1<br>16 E4 (Ships) |
| | "PERMADINE" Zinc Phosphate Coating Chemical | Rust and corrosion prevention | Nuts, bolts, screws, hardware items, tools, guns, cartridge clips, fire control instruments, metallic belt links, steel aircraft parts, certain steel projectiles and many other components. | MIL-C-16232<br>U.S.A. 57-0-2, Type II, Class B<br>U.S.A. 51-70-1, Finish 22.02, Class B<br>Navy Aeronautical M-364<br>U.S.A. 72-53 (See An-F-20) |
| | "THERMOIL-GRANODINE" Manganese-iron Phosphate Coating | Wear-resistance anti-galling, safe break-in of friction or rubbing parts. Rust proofing. | Friction surfaces such as pistons, piston rings, gears, cylinder liners, camshafts, tappets, crankshafts, rocker arms, etc. Small arms, weapon components. Hardware items, etc. | MIL-C-16232<br>U.S.A. 57-0-2, Type II, Class A<br>U.S.A. 51-70-1, Finish 22.02 Class A<br>Navy Aeronautical M-364<br>U.S.A. 72-53 (See AN-F-20) |
| | "GRANODRAW" Zinc-iron Phosphate Coating | Improved drawing, extrusion, and cold forming | Blanks and shells for cold forming, heavy stampings, tubs; tubing for forming or drawing; wire; rod; etc. | ——— |
| ALUMINUM | "ALODINE" Protective Coating | Improved paint adhesion and corrosion resistance | Aluminum products of similar design such as refrigerator parts, wall tile, signs, washing machine tubs, etc; aircraft and aircraft parts; bazookas (rocket launchers), helmets, belt buckles, clothes dryers, clothesline, rocket motors, etc., aluminum strip or sheet stock. | MIL-C-5541 (See also QPL-5541-1)<br>MIL-S-5002<br>AN-F-20<br>U.S. Navord O.S. 675<br>16 E4 (Ships)<br>AN-C-170 (See MIL-C-5541)<br>U.S.A. 72-53 (See AN-F-20) |
| ZINC | "LITHOFORM" Zinc Phosphate Coating Chemical | Improved paint adhesion | Zinc alloy die castings, zinc or cadmium plated sheet or components, hot dip galvanized stock, galvanneal; signs; siding; roofing; galvanized truck bodies; etc. | QQ-P-416<br>RR-C-82<br>JAN-F-495<br>AN-F-20<br>U.S.N. Appendix 6<br>U.S.A. 72-53 (See AN-F-20) |

CHEMICALS ACP PROCESSES

**WRITE FOR DESCRIPTIVE FOLDERS ON THE ABOVE CHEMICALS AND FOR INFORMATION ON YOUR OWN METAL PROTECTION PROBLEMS**

CHEMICALS ACP PROCESSES

do the job. This is one of the newer compounds which will give excellent results at greatly shortened time cycles. The product is so highly concentrated that only 2 to 4 ounces of it are necessary in the average size production barrel. In line with the new trend in the chemistry of barrel finishing, this product will leave the equipment as well as the medium scrupulously clean, since top rinsibility and detergency are factors built into the product.

A new burnishing compound has recently been made available which covers a wide range of application. It yields a high luster finish resembling hand-buffed operations on many metals and alloys. In this case we are confronted with an emulsion type cleaner which has a long life span so that it may be used continuously or intermittently over a period of time. This particular product also has the advantage of working with almost any tumbling medium. New type cleaners are also available for roughing and finishing operations on steel. Savings in time on cutting operations are often quite pronounced.

There is little doubt but that the new trends in the chemistry of barrel finishing will give a new impetus to the development of new and better cleaners for the barrel finishing industry.

---

Scientists estimate that there is about twice as much nickel in the earth's crust as there is copper, zinc, and lead combined. More than 60 nickel minerals are recorded in modern literature, but only four of them have had commercial importance.

---

Science has promised us truth—an understanding of such relationships as our minds can grasp; it has never promised us either peace or happiness. —*Gustave Lebon.*

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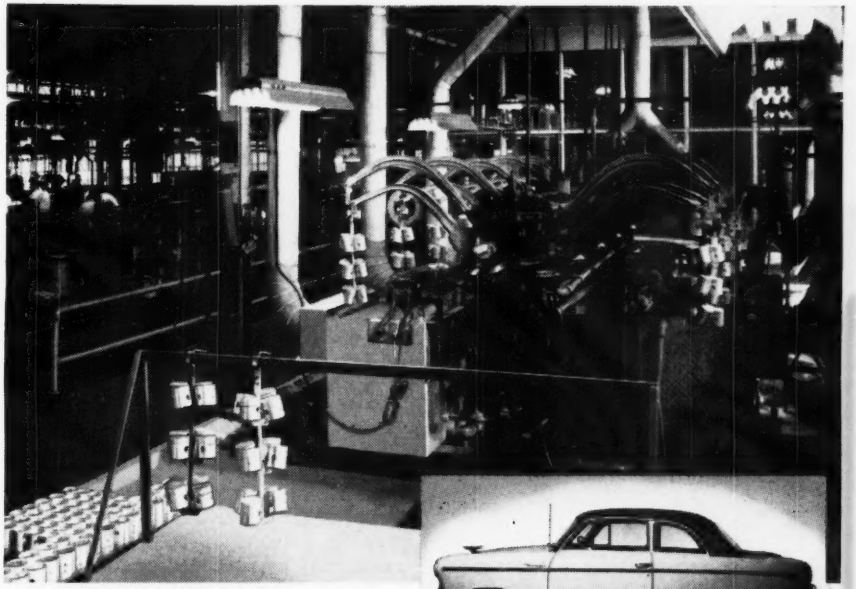

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Here, a fast and efficient Stevens Full Automatic Plating Machine keeps pace with high-level automotive production in piston plating for both the military and civilian models of the Willys automobile.

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2. **Ease of control. Single, absolute control permits minimum man-power requirements.**
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Throughout Industry, for dependable performance and enduring efficiency in metal finishing and plating, the watchword is STEVENS. Our field representative nearest you will be happy to tell you how a Stevens machine can be tailor-made to fit your precise requirements and solve your plating and processing problems. Call him or write to our headquarters address below.

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DETROIT 16, MICHIGAN

# *Fitting* Vapor Degreasers *to the Job*

By GILBERT C. CLOSE

FITTING vapor degreasers to the job in a manner to produce best results at the lowest cost implies far more than mere purchase of equipment and assignment of certain types of work for it to do. During the past few years, improvements in degreaser design and a wider selection of improved solvents raised these machines to the status of precision production equipment. As such, selection of degreasing equipment, choice of solvent, and assignment of work deserve careful and intelligent study.

The type of work to be cleaned, the soils that must be removed, and location of the work within the manufacturing area are three factors which have an important bearing on the type of degreasing equipment needed. Each of these factors can seriously crimp the efficiency of a degreaser if ignored. Fortunately, degreaser manufacturers are producing modifications of equipment that recognize these factors, or are including inbuilt facilities for modifications as required.

Basically, there are three types of vapor degreasers available. The simplest type cleans by vapor immersion only. A second type employs solvent immersion followed by exposure of the work to the vapors. The third type employs a solvent spray compartment which may be preceded or followed by solvent immersion, with final cleaning by vapor only. Gas, steam heated, and electric models are available. Due to the plumbing, venting and flues required, gas and steam heated degreasers require permanent installation. Thermostatically controlled electric degreasers, which do not require permanent external connections of any type, are ideal when portability of equipment is desired. (Note: Most electric degreasers do not require a cold water condenser to control vapor level. This is accomplished automatically by maximum and minimum vapor temperature thermostats. Even when condensers are used, rubber hose rather than permanent pipe installations may be employed.)

In choosing a vapor degreaser, the size of the work to be cleaned is an obvious controlling factor. In some cases, "size" does not always pertain to a single part, but to bundles of nested parts. The penetrating ability of the solvent vapors makes nesting of parts a distinct and time-saving possibility

provided such nesting does not interfere with the drainage of the condensed solvent vapors. When only a few large parts are to be cleaned as against numerous smaller units, it may be less costly and more efficient to clean them in a solution tank and equip the degreaser with a conveyor for the smaller units, thus making the cleaning cycle automatic in operation.

Another controlling factor is the gauge or metal thickness of the parts to be cleaned. Cleaning action by vapor immersion is limited to the time required to raise the metal to vapor temperature. Once this temperature is attained, there is no more condensation on the part and cleaning automatically ceases. It is thus evident that very thin gauge parts that are extremely dirty may become too hot for effective cleaning action before all the dirt has been flushed away. The only remedy in this case is immersion of the parts in warm solvent prior to exposing them to the hot vapors, or use of a warm solvent spray which loosens and removes the bulk of the dirt by mechanical action. It is obvious that a degreaser which cleans by vapor immersion only would not serve under these conditions. One containing facilities for solvent immersion or solvent spray would be required.

In some cases, parts that would benefit from vapor cleaning are so shaped that they prevent drainage of the condensed vapors regardless of the way they are suspended from racks or placed on a conveyor. When a number of such parts must be cleaned, the time and cost of repositioning each for complete drainage may be excessive. This can often be solved by equipping the vapor degreaser with tumbling facilities which reposition the parts automatically before they leave the cleaning chamber. The tumbling facilities used depend upon the conditions involved, but this problem can generally be solved by any competent tooling engineer, or by the equipment manufacturer.

Along with the shape, size and gauge of the work, the nature of the soil to be removed influences the efficiency of vapor degreasing equipment. Some of the more common applications of vapor degreasing includes the removal of hard petroleum greases, protective oil films, cutting oils and coolants, waxes, tallow, and animal fat compounds. Flushing off filings and chips accumulated in machining operations, and preparation of surfaces for anodizing, painting, spraying, and in some cases plating, are other common uses.

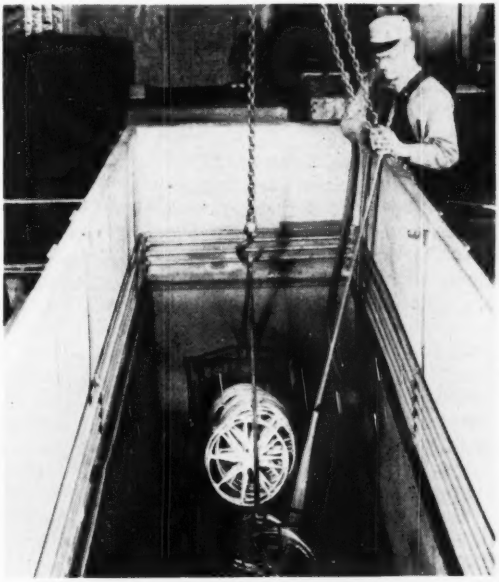

Fig. 1—Hoist-operated vapor-slush degreaser in which work is cleaned in vapor, pressure-sprayed with clean solvent distillate, and then vapor-cleaned.
*(Photo courtesy Detrex Corp., Detroit 32, Mich.)*

These common soils can be removed by any of the better solvents if condensation of the vapors continues until all dirt is removed. But, as previously stated, if the part is of very thin gauge material, or if the dirt is so heavy that

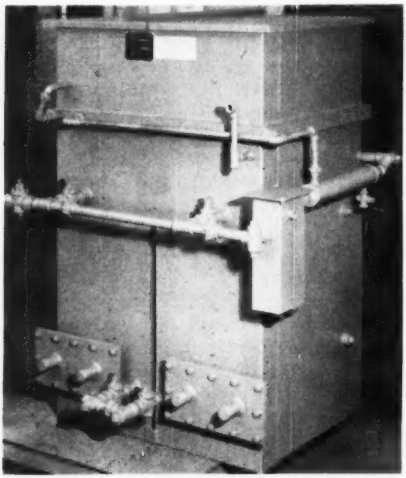

Fig. 2—The Blakeslee Model 2-LV degreaser, here illustrated, has a boiling liquid wash with a vapor rinse. The machine is particularly adapted to use on hand-operated finishing lines, and for cleaning die castings. (*Photo courtesy G. S. Blakeslee & Co., Chicago 50, Ill.*)

the part reaches vapor temperature before enough vapor has condensed to wash it away, a degreaser with either solvent immersion or solvent spray facilities will have to be used. In some cases where exceptionally dirty parts are involved it may be more practical to preclean them in an alkali solution tank followed by vapor cleaning using vapor immersion only. This has the added advantage of keeping sludge and contaminant out of the degreaser solvent, and reducing the number of times the solvent must be distilled and the degreaser cleaned.

Vapor degreasers are not a universal cure-all for cleaning problems, or fitting them to the job would be a simple procedure indeed. In many plants uncommon types of soil may be encountered, and it should not be taken for granted that available solvent vapors will remove them. If the melting point of the dirt is above that of vapor temperature, and its adherence to the work is tenacious, neither solvent immersion nor spray will remove it effectively. Scale on the ferrous metals falls under this category. On the other hand, degreasing scaled parts will remove other dirt that may be present and thereby minimize contamination of subsequent pickling solutions.

Lesser known uses of vapor degreasing, while successful in many instances, have not been accepted as general practice. These include loosening of paint, varnish and lacquer removal of tar and road oils, removal of drawing tallow, and removal of carbon deposits from engine piston heads. Electrical maintenance departments have been using vapor degreasers to remove greases, oil and dirt from stators, rotors, armatures and commutators. Small portable degreasers have been used with success for cleaning differential housing on automotive equipment and for degreasing marine boilers and condensers without removing them from the ship. Ordnance plants report that vapor degreasing is effective for removing powders, wadding lint, silk and so on from rifling and arms mechanisms. But these are isolated instances and should not foster the opinion that all dirt is susceptible to solvent vapor cleaning.

A vapor degreaser is not well fitted to its job unless the most effective solvent available for the type of work involved is being used. While many solvents are available, trichlorethylene and perchlorethylene are the two that have received widest acceptance in the metal cleaning field. Lesser known solvents are limited in application, or under certain conditions are susceptible to oxidation, or hydrolysis in their action on metals.

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**TABLE I**

| | Trichlorethylene ($CHCl : CCl_2$) | Perchlorethylene ($CCl_2 : CCl_2$) |
|---|---|---|
| Specific Gravity | 1.461 | 1.618 |
| Weight per gallon (lb.) | 12.16 | 13.46 |
| Approximate Vapor Density | 4.5 | 5.3 |
| Evaporation Rate (hr. for 100%) | 188.8 | 249.8 |
| Solubility in Water | 0.1 | insol. |
| Corrosive action on metals | low | nil to low |
| Toxicity | medium | low to medium |
| Flammability (Underwriters Rating) | 3-5 | Non-Flam. |

General qualifications of a vapor solvent for all-round use include: nonflammablity; low toxicity rating; light stability; high vapor density; and high boiling point. Table I compares trichlorethylene and perchlorethylene in these respects.

It will be noted that the vapor density of perchlorethylene is much the higher and thus is more readily confined to the vapor chamber. Furthermore, the weight of escaped vapors will tend to keep them below the breathing level of the operator, thus in effect reducing their toxic effects. The greater specific gravity of perchlorethylene indicates more effective flushing of the work, and on a trial basis it has been proved that two passes through perchlorethylene vapor are equal in cleaning power to three passes through trichlorethylene vapor.

The higher boiling point of perchlorethylene results in hotter vapor which in turn will soften dirt with higher melting points. This is important with deposits of the harder greases and tallows. It also takes longer for the cold work to reach vapor temperature, thus extending the period of condensation and prolonging the flushing action. Despite this higher boiling point, the evaporation of perchlorethylene is less than that of trichlorethylene, thus reducing vapor losses.

While under normal conditions the corrosive action of either solvent on metals is almost nil, the affinity of trichlorethylene for water may cause some corrosion when moisture is present. Furthermore, as the boiling point of trichlorethylene is lower than that of water, moisture tends to accumulate in the solvent where it is converted to hydrochloric acid with resultant hydrolysis of the metals it contacts. The higher boiling point of perchlorethylene drives off moisture in the form of steam before harmful effects can occur. This does not imply that trichlorethylene is an inferior solvent, but indicates that certain conditions warrant use of the newer solvent.

Faulty operation and maintenance can sharply curtail the efficiency of any vapor degreaser regardless of how well it is otherwise adapted to the type of work it must do. A few proven pointers along this line may aid in solving problems that are wrongly attributed to degreaser design, or the solvent in use. These pointers are the product of shop experience and apply generally to all types of degreaser equipment.

1. Never place work in degreaser until the vapors have reached the normal vapor level. Normal level indicates that normal vapor temperature prevails.
2. Insert work slowly to prevent undue agitation of the vapor. Re-

# How to Determine Impurities in Copper Plating Baths

**SILVER** in copper plating baths may be determined colorimetrically, by using a carbon tetrachloride solution of dithizone to produce the colored solution. The hue measured is that of the mixed color of silver keto dithizonate and cupric keto dithizonate. Small amounts of certain other metals do not interfere, nor is separation of the silver required.

**CHLORIDE**, also, may be determined colorimetrically. The method depends upon the addition of a known quantity of silver ions and determining the excess of silver ions remaining after silver chloride has been precipitated. The excess is determined by the mixed color of silver and cupric dithizonate.

**LEAD** traces are determined as follows: Organic material is oxidized with phosphoric acid and the lead is separated from interfering ions by extracting with a carbon tetrachloride solution of dithizone in the presence of potassium cyanide. Transmittance of the solution is measured and the quantity of lead determined from a calibration curve.

**CHROMIUM:** To determine chromate chromium, nitric acid is added to oxidize any reducing agents, phosphoric acid is added to make a complex with $Fe^{+++}$, and diphenylcarbazide is added to form a colored complex. Transmittancy of the solution is measured, and the amount of $CrO_3$ present as chromate is read off the calibration curve.

For total chromium analysis, iron is first removed by precipitation. The chromium is oxidized first by fuming with perchloric acid and then by boiling with ammonium persulfate in the presence of silver ions. The silver is precipitated. The solution is centrifuged, the transmittancy of the clear supernatant solution measured, and the amount of $CrO_3$ present is determined from the calibration curve.

**NICKEL** can be accurately determined colorimetrically by forming nickel dimethylglyoxime but copper must first be removed quantitatively.

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move at the same rate. Rapid movement of the work in or out of the cleaning chamber will cause vapor to spill over the freeboard with resultant solvent losses and increased danger to operating personnel. The speed of work being lowered or raised should not exceed 11 feet per minute.

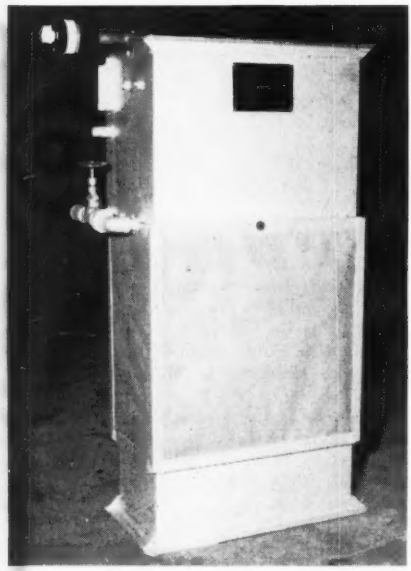

**Fig. 3—Straight vapor laboratory or bench-type degreaser (D'Oiler) for degreasing small parts. The unit is electrically heated and completely fitted with the necessary electrical controls as shown in the photograph.**
*(Photo courtesy Mechanical Process Co., South Orange, N. J.)*

3. Leave work in the vapor until heavy vapor fog disappears from the surface of the metal. This fog is evidence that condensation is still occurring. When condensation ceases the fog will disappear and the work can be removed.
4. If the work is comprised of machined parts that will receive a coating of protective oil after degreasing, these parts should be dipped in the oil immediately after cleaning and while still warm. Thus the metal pores will be expanded and a better protective film will be formed.
5. Arrange all cup-shaped parts for complete drainage of the condensed solvent. If parts are tumbled while in the vapor, inclusion of cork balls will prevent damage to machined edges and surfaces.
6. Keep degreaser covered at all times when not in use. Re-distill solvent and clean sludge chambers as frequently as needed.
7. Add inhibitors as recommended by the solvent supplier. In general work, 0.5 ounce of sodium carbonate per gallon solvent is recommended as a neutralizing agent to offset any acids formed.

These are only general operational and maintenance suggestions but they will apply in the majority of degreasing work. Specific rules and regulations for certain types of equipment should be rigidly followed. The manufacturers of degreasing equipment can answer most questions that arise. If information is not available from this source, the problem should be thoroughly studied until the right answer is obtained.

It is well to keep in mind that degreasing equipment is not completely fitted to its job until every factor that will reduce costs and raise efficiency is recognized and accorded proper attention. Lesser efforts will only offset inherent advantages of vapor degreasers.

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Nickel's usefulness today is primarily due to the Canadian nickel industry. Over the past 30 years it has pioneered in research and development work looking to the application of nickel to the many and diverse products of our industrialized society. Simultaneously, it has taken world leadership in the production of nickel.

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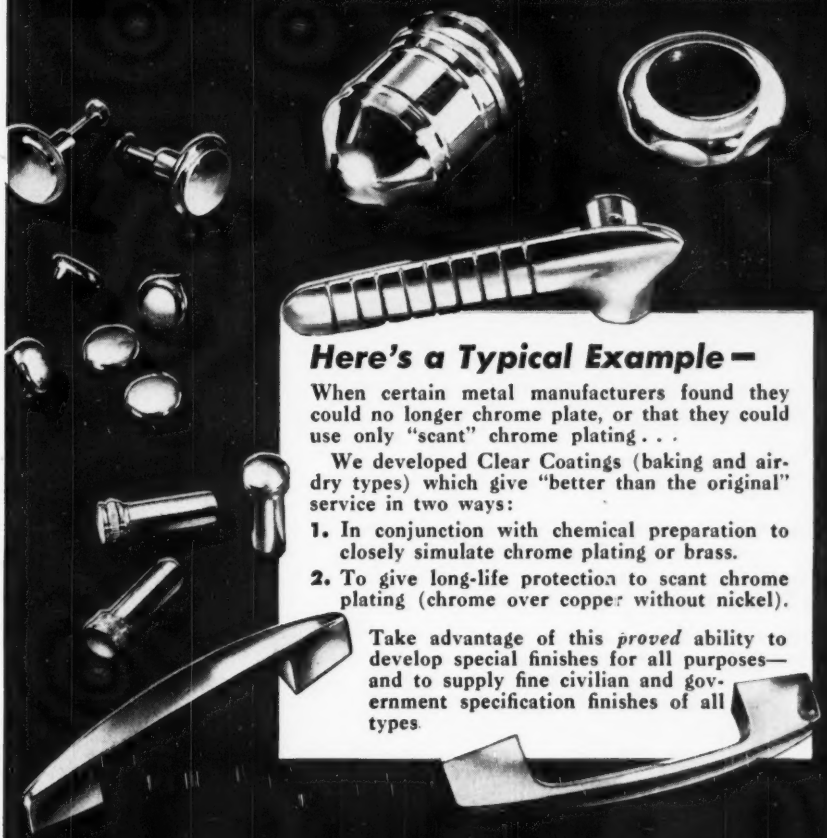

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# Hot Lacquer Provides Finish for Dental Equipment

By EZRA A. BLOUNT
Editor

WHILE the beauty, quality, and permanence of the dental equipment illustrated on the opposite page is normally not of much interest to a patient, it is of great concern to the dentist. The dentist's equipment must always be immaculate and attractivity finished, preferably in harmonizing colors. Such considerations help create a restful atmosphere which contributes to the patient's comfort, even if he does not realize it.

Fully cognizant of the dentist's needs, The Weber Dental Manufacturing Company, Canton, Ohio, has been producing high-grade dental equipment for over 50 years. To emphasize its efforts in this field, the company employs the identifying phrase, "a partner in dental progress."

Recently, realizing that color styling of dental equipment alone was not enough, the Weber organization introduced "Kolorite," a complete color styling scheme for equipment and office facilities as well. Harmonizing color schemes—ten in number—are recommended. These ten plans include suggested combinations of colors for Weber dental equipment, reception rooms and offices, operating rooms and laboratories. Color styling of floor covering and draperies is included, so that the dentist can take full advantage of the psychological use of color to ease the nervous tension of his patients, and thus make his task easier.

It goes without saying that a company progressive enough to sponsor a color styling service for the dentist would be greatly concerned about the beauty and utility of the finishes applied to its products. These include dental chairs, dental X-ray equipment, dental operating units, dental engines, fountain cuspidors, and other accessory products.

As has been mentioned, these items of dental equipment are available finished in ten colors of lacquer—and this finish accounts for a majority of the product surface. As design and use dictate, certain items and products are finished in glistening, bright chromium plate. The importance of finishing to

the company has been expressed by H. E. Nelius, Weber factory manager, as follows:

"We know of no other industry, except the furniture manufacturing, that requires a more exacting finish on its products than the dental equipment industry. This is further evidenced by the fact that better than 45 per cent of direct labor hours in our plant are charged to finishing, including polishing, buffing, chromium plating, and spray painting."

### The Finishing Process

Weber products are composed of parts fabricated from cast aluminum, cast iron, and steel stampings. To hold the weight of the products to a minimum, yet secure adequate strength, aluminum castings are specified for many parts. An outline of the operations employed in finishing an aluminum sand casting is listed below. This indicates clearly that finish quality is of primary concern to Weber.

1. Polish casting to a smooth finish without altering the contours of the casting.
2. Inspect.
3. Degrease.
4. Burn off at 450 to 500 deg. F. for 5 to 6 hours.
5. Spray first primer coat.
6. Bake at 350 deg. F.
7. Apply putty to fill all pits.
8. Sand surface.
9. Spray second primer coat.
10. Bake at 350 deg. F.
11. Inspect and patch pits in putty if necessary.
12. Sand surface smooth.
13. Inspect.
14. Spray two coats of hot lacquer applied at 170 deg. F. (see Fig. 1).
15. Air dry for 24 hours.
16. Hand sand to smooth surface and eliminate any irregularities (see Fig. 2).
17. Buff on lathe to produce final luster on lacquered surface (see Fig. 3).
18. Inspect and transfer to the final assembly department.

The above outline applies generally in the case of cast iron and steel parts. Cast iron and steel parts are prepared for finishing by means of a phosphatizing process. Hence, Step 4, above, would be supplanted by the phosphatizing process, and,

Fig. 1—Parts for Weber dental equipment are conveyed through a spray booth on an overhead chain transport conveyor. Here an operator sprays a part with hot lacquer. The Bede paint heater can be seen in the foreground.

Fig. 2 — The lacquered and dried parts are sanded with 400 emery wetted with varnoline.

The spray mixture is pumped through a Bede paint heater which is set to maintain a lacquer temperature of 170 deg. F. This furnishes lacquer at the spray nozzle with the same viscosity as that secured in the cold process by mixing equal parts of lacquer and thinner. Also, since a higher solids content lacquer is now being sprayed, the specified dry film thickness of 0.0015 to 0.003 inch can be obtained by spray-

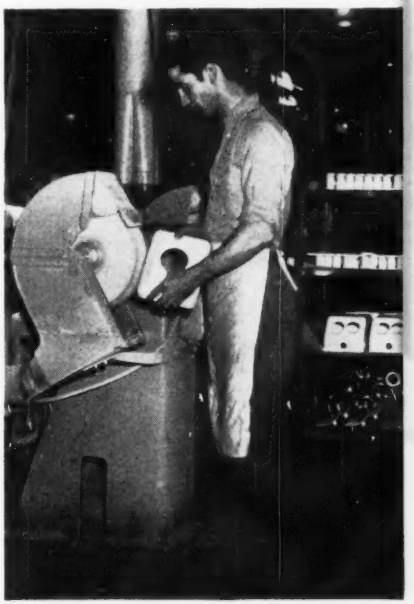
in the case of steel stampings, some of the preliminary polishing steps and and some of the puttying and patching steps may be eliminated.

**Hot Spray Advantages**

Prior to the adoption of the hot lacquer spray process at Weber, lacquer finishes were sprayed at a viscosity of 22-27 seconds as measured in a No. 4 Ford cup. To obtain the necessary viscosity, lacquer was thinned with an equal portion of thinner. Further, to secure the required dry film thickness of 0.0015 to 0.003 inch, it was necessary to spray five or six coats of lacquer, passing the parts through the spray booth twice. Care had to be exercised that successive coats were not applied too soon after the preceding coat or solvents in the preceding coat would be trapped in the film and blistering would result. Weber executives were not satisfied with the quality of the finish obtained, since the amount of solvent used had the effect of reducing the luster and depth of the final finish.

With the adoption of the hot spray process, only one gallon of thinner is used with each four gallons of lacquer.

Fig. 3—Final luster on lacquered parts is secured by buffing on a Perm-A-Core wheel using White Diamond 4X Buffing Compound. (*Photos courtesy The Weber Dental Manufacturing Co., Canton 5, Ohio*)



ing two coats of lacquer as the part in question makes only one trip through the spray booth.

Mr. Nelius, Weber factory manager, advises that this change in spraying procedure has been a major factor in doubling finish line production as well as reducing rework to a minimum. Maintenance and material savings have also been effected. Most important of all to Weber management is the fact that a finish of greater depth and luster is now being secured on Weber dental equipment.

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The psychology of human beings varies from person to person, but color associations are surprisingly constant and similar. Universal reactions to color are noted in most individuals of all races. The Color Research Laboratory of Sun Chemical Corporation, New York, has made interesting tests in the major colors—their general appearance, mental associations, direct associations, objective and subjective impressions.

It has been found that under colored lights muscular reactions vary. Reactions were 12 per cent quicker than normal under red light, while green retarded the response.

Modern American color associations made an interesting reference. Red is associated mentally with heat, fire, blood; and directly with danger, Christmas, Fourth of July, and St. Valentine's Day. It is connected with anger or rage. Orange is associated with warmth, autumn, Hallowe'en, and Thanksgiving. It is jovial, lively, forceful. Green is cool like water and associated with St. Patrick's Day. It is quieting, refreshing, peaceful, and also may suggest guilt. Blue suggests the sky, water, ice, soberness, and melancholy.

Purple is cool and suggests darkness and shadow, mourning, Easter. It is dignified, mystic. Black suggests night and darkness, emptiness, death, depression.


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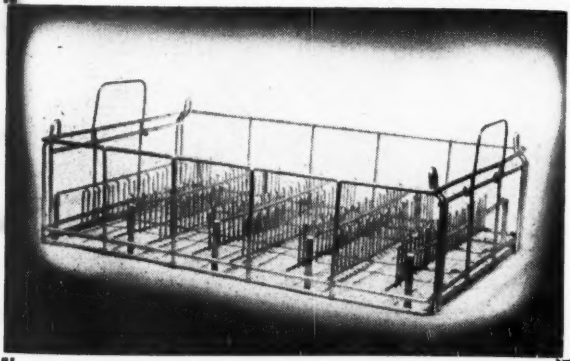

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# Spotlighting FINISHING Progress

## Electrochemical and Chemical Coatings for Aluminum

ELECTROLYTIC oxide coatings formed on aluminum by anodic treatment constitute an important type of finish for this metal. Oxide finishes are obtained by treating the metal anodically in various electrolytes to produce a thin, inert, and durable aluminum oxide on the metal surface. The film formed is hard and offers abrasion and corrosion protection to the underlying metal. It is high in dielectric strength and possesses good absorption qualities for dyes and paints. Protective and decorative coatings can also be produced on aluminum by chemical means.

### Protection Offered by Anodic Coatings

Anodic coatings protect aluminum in a number of ways. Although the oxide coating is not immune to scratching by a sharp edged tool, its hardness helps protect against scuffing and eliminates smudging. For this reason it has been used in such applications as on cafeteria trays, hand rails, and cigarette lighters. The abrasion resistance of the coating generally increases as the thickness increases.

In connection with the study of procedures for measuring coating thickness by stripping methods, R. B. Mason, Aluminum Research Laboratories, discovered that a solution of phosphoric and chromic acids quickly dissolves the oxide coating and has practically no effect on the aluminum. The weight of the coating can thus

By DR. ALLEN G. GRAY

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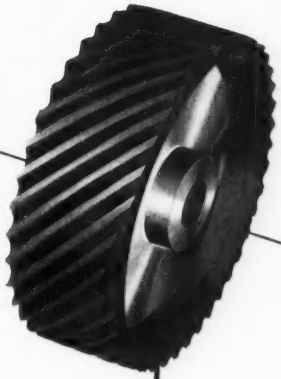
**A Monthly Digest of Current Technical Progress Indicating Significant Trends and Developments in the Finishing Industry**

# ALWAYS BETTER



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be obtained, and this method has been applied in studies on the efficiency of anodic oxidation and in tests on the effect of either minor or major changes in the coating procedure on the coating produced.

Data published by the Aluminum Company of America have emphasized that the corrosion protection afforded by the coating depends first of all upon its continuity. The continuity of the coating may be interrupted by inclusions of constituent, oxidation product of constituent, or holes left by solution of constituent. The continuity is therefore closely related to the composition and structure of the alloy being coated. Other things being equal, the effective continuity of the coating increases with thickness of the coating up to certain limits. Coatings having a thickness of approximately 0.5 to 0.6 mil give substantially better performance over a period of years than coatings only 0.2 to 0.3 mil in thickness.

The effectiveness of anodic oxide coatings for protecting aluminum alloys against corrosive attack has been demonstrated by salt spray and atmospheric exposure tests as well as by the excellent record anodically coated aluminum alloys have made when used for aircraft and other items of equipment employed by the Armed Forces under many different service exposures. Several years ago, Sub-Committee VI of Committee B-7 of the American Society for Testing Materials started a series of tests to evaluate the protection afforded aluminum alloys by anodic coating. The samples consisted of eight different panels of 52S and 17S-T alloy sheet which were supplied to six cooperating laboratories for testing. These panels had oxide coatings of several thicknesses and had been sealed in various ways. Some of the results of the salt spray test and atmospheric exposure tests of these panels are listed in Table I. Some of the test panels


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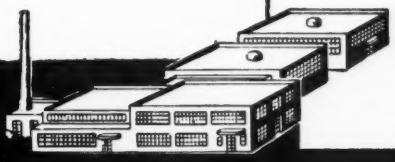

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**TABLE I**

**SALT SPRAY AND ATMOSPHERIC EXPOSURE TESTS OF ANODICALLY COATED ALUMINUM PANELS BASED ON A.S.T.M. TESTS**

| Alloy Coated | Electrolyte | Sealing Procedure | Thickness of Coating In. | Results of Corrosion Tests | |
|---|---|---|---|---|---|
| | | | | First Attack in Salt Spray | Order Number of Panels in Atmospheric Exposure Tests** |
| 52S | Sulfuric acid | Hot water | 0.00028 | None* | 5 or 6 |
| 52S | Sulfuric acid | Hot water | 0.00039 | None* | 2 |
| 52S | Sulfuric acid | Dichromate | 0.00012 | None* | 7 |
| 52S | Sulfuric acid | Dichromate | 0.00029 | None* | 3 |
| 52S | Sulfuric acid | Dichromate | 0.00037 | None* | 1 |
| 17S-T | Sulfuric acid | Dichromate | 0.00041 | None* | 6 or 5 |
| 17S-T | Chromic acid | No seal | 0.00005 | 600 hr. | 8 |
| 17S-T | Sulfuric acid | Hot water | 0.00033 | 600 hr. | 4 |

* After 6 months' exposure.

** Approximate relative condition of panels based on atmospheric exposure tests made at New Kensington, Pa., Philadelphia, New York City, and Chicago. The periods were from 26 to 45 months. Order No. 1 indicates panel in best condition and panel No. 8 the worst.

*(Courtesy Aluminum Company of America, Pittsburgh, Pa.)*

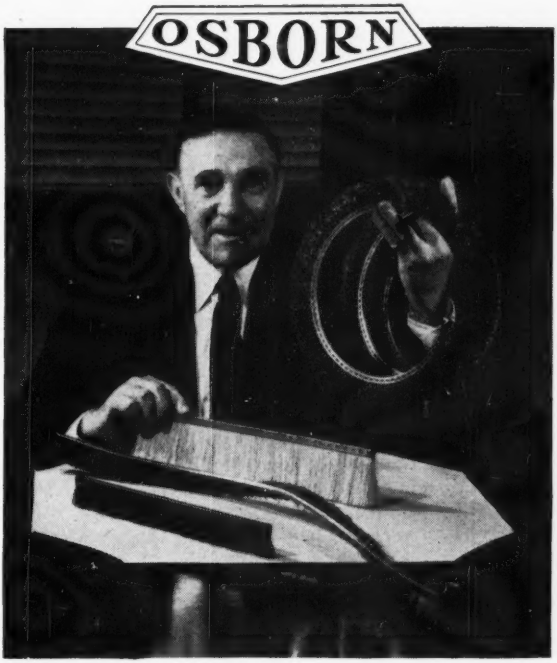
stood up in the salt spray satisfactorily for a six months' exposure period. Laboratory corrosion tests and service experience indicate that anodic coatings will provide effective protection against weathering and corrosive attack for relatively long periods.

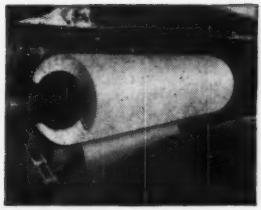
### Sealing Treatments

One important operation in the anodizing of aluminum is the sealing treatment. Sealing, which is the final step in the anodic process, closes the pores of the coating and makes it non-adsorptive and stain-proof. Anodic coatings as formed, because of their porous and adsorptive characteristics, can be colored by the adsorption of dyes and by the precipitation of pigments within the pores. From the standpoint of metal protection, however, it is more important that the pores be sealed by various procedures which increase the protective value of the coating.

One important sealing procedure is treatment of the anodic coatings with chromate solutions resulting in adsorption of chromate in the pores. The adsorbed chromate-sealed coating also provides an excellent base for protective paint coatings. One of the principal uses of anodic coatings has been as a base for paints on aircraft structures. Anodic coatings provide increased adhesion and life to paint coatings because they provide an inert surface between the metal and the paint film. This minimizes the possibility that any moisture penetrating the paint coating will attack the metal and cause loss of adhesion. Anodic coatings made in a chromic acid electrolyte were first used for this purpose, but there is now considerable use of coatings formed in a sulfuric acid electrolyte and sealed in a chromate solution.

One of the most widely used sealing processes involves treatment of the anodized coating with hot or boiling water, resulting in the transformation of aluminum oxide into aluminum monohydrate, $Al_2O_3.H_2O$. There is no change in the appearance of the oxide coating, but it is no longer adsorptive.



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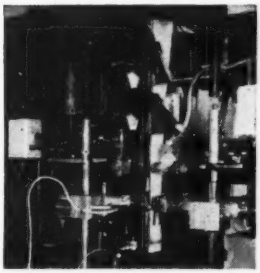

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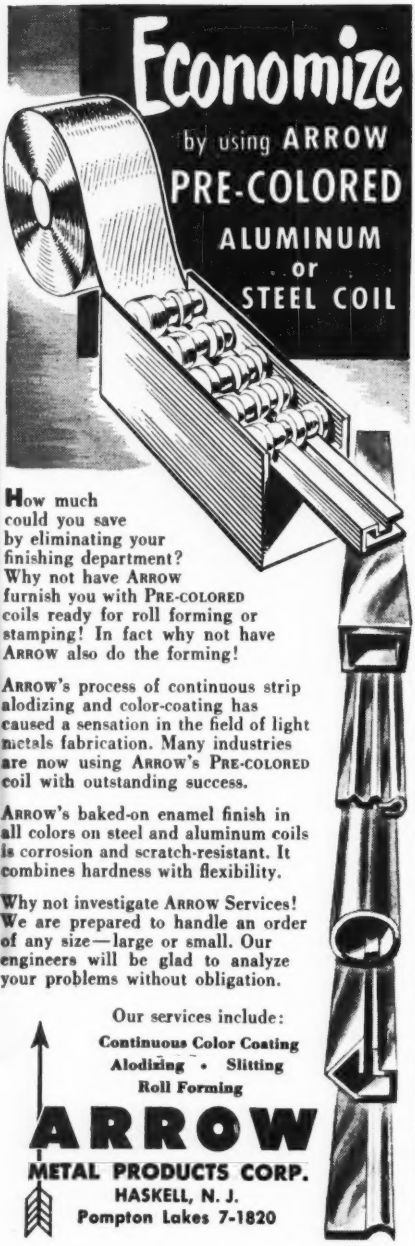


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The pores may also be sealed by treatment with hot, dilute solutions of nickel or cobalt acetate. Colloidal hydroxides of these metals formed by hydrolysis are occluded in the pores and seal them. The pores may also be sealed with oils, waxes, resins and so on.

The type and pH of the water used in sealing anodized coatings have been found to affect the life of the coatings, according to tests conducted by A. E. Durkin, General Electric Company, the details of which were recently reported in "The Iron Age". If tap water containing between 50 and 100 p.p.m. of dissolved solids is used in sealing, it is evident that these impurities can be sealed into the anodic coating. A varying pH in the seal water causes nonuniformity in the end product. In normal sealing operations, it has been found that aluminum and copper impurities precipitate on the work being processed, as the pH of the sealing water goes below 5.2. It was pointed out by Durkin that if the pH can be controlled above that point, prolonged sealing tank life can be expected in addition to the increased corrosion resistance of the parts being processed.

In the tests conducted by Durkin, sample 24ST and 2S aluminum panels were anodized by the sulfuric anodizing process of the Aluminum Company of America. They were placed in the salt spray for corrosion testing after being sealed by the various processes. Anodized samples sealed in demineralized water were more corrosion resistant than those sealed in tap water at solids content of the dimineralized comparable pH values. The reduced solids content of the demineralized water was credited with this improvement. Tap water can also be used effectively where high purity water is not available, if its pH is controlled as close to 6.0 as possible. Durkin pointed out that control of pH is more critical in tap water sealing than it is in demineralized water sealing.

Sealing conditions may also affect

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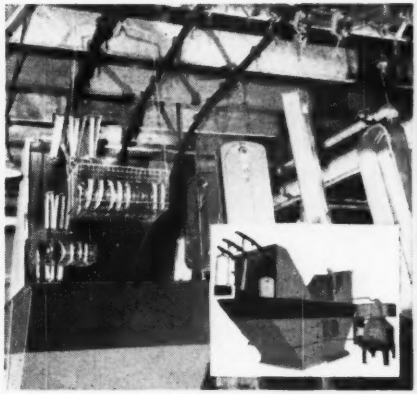

**Parts emerge from degreaser on three separate conveyor lines ready for the next operation. Inset shows degreaser complete with solvent recovery still.**

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**TABLE II**
PROCEDURES FOR ANODIZING ALUMINUM

| ELECTROLYTE | OPERATING CHARACTERISTICS | TYPE OF COATING |
|---|---|---|
| Sulfuric acid, 15 per cent | 15 volts 12 amp./sq. ft. | White or transparent coating; max. thickness about 0.001 inch. |
| Chromic acid, 3 per cent | 40 to 50 volts 3 amp./sq. ft. | Gray coating usually about 0.0001 inch thick. |
| Oxalic acid, 3 per cent | 65 volts 12 amp./sq. ft. | Cream-colored coating; max. thickness usually about 0.001 inch. |
| Boric acid plus ammonium borate | 50 to 500 volts | Thin, iridescent coating; thickness proportional to voltage. |

the corrosion resistance of anodic coatings when exposed to elevated temperatures. When heated to temperatures of between 212 and 392 deg. F., anodic coatings craze or crack, and untreated aluminum is exposed to corrosive attack. If all, or even part, of the dissolved solids in the sealing water are organic in nature, they can be burned out of the coating in time at these elevated temperatures. These burned out spots would be points of weakness in the coating and would probably be the points of first failure from corrosion.

### Anodic Coating Procedures for Aluminum

The anodic coating of aluminum is best carried out in acid solutions. In discussing anodizing in "The Corrosion Handbook*," J. D. Edwards, Aluminum Research Laboratories, cited three possible systems depending on the characteristics of the electrolyte. First, the oxide formed may be substantially insoluble in the electrolyte. A relatively impervious and thin coating is formed. This behavior is observed in electrolytes such as solutions of boric acid and borates. The principal use of this type of coating is in electrolytic condensers and rectifiers.

Second, the oxide formed may be slowly dissolved by the electrolyte. A porous coating, permeated by the electrolyte, is formed and growth of the coating continues as long as the current passes. Coatings of this type are formed in electrolytes such as solutions of sulfuric, oxalic, or chromic acids.

Third, the oxide may dissolve in the electrolyte substantially as fast as it is formed. Properly conducted, this type of anodic treatment results in electrolytic brightening of the surface. A solution of fluoboric acid is one electrolyte used for this purpose.

Electrolytes of the second type are generally used for the production of "thick" coatings for the corrosion protection of aluminum. Coatings of this type can be controlled in thickness and porosity and through various aftertreatments, can be sealed so that they offer greater protection against corrosion. Typical commercial conditions for anodizing aluminum are summarized in Table II. Figure 1 shows a commercial anodizing installation. Figure 2 is a view of an anodizing tank.

* Sponsored by the Electrochemical Society and published by John Wiley & Sons, New York, H. H. Uhlig, Editor-in-Chief.

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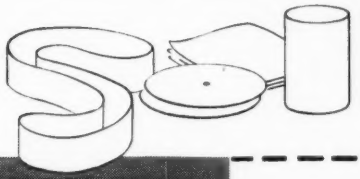

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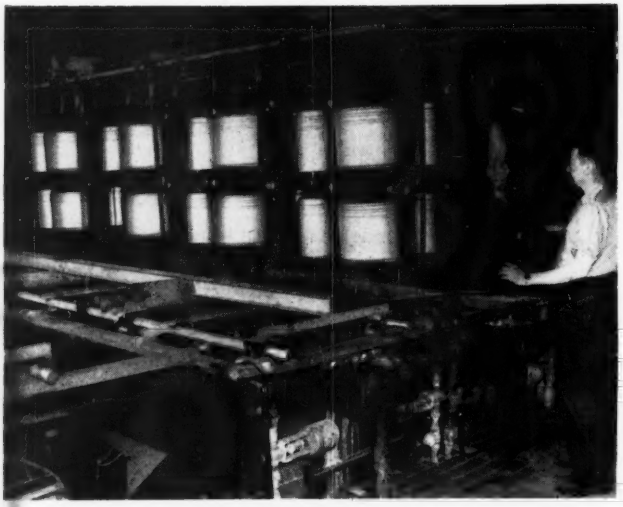


Fig. 1 — Aluminum washing machine tubs on racks being cleaned before anodizing.
*(Photo courtesy Reynolds Metals Co., Louisville, Ky.)*

possible by mechanical or electrochemical methods.

Surface conversion processes prepare the surface of aluminum for an organic finish. Some of the common methods of converting aluminum surfaces, not involving electrochemical anodizing operations, are acid etching, treatment with phosphoric acid-organic solvent mixture, production of chem-

### Chemical Coatings

A wide variety of protective coatings can be produced on aluminum by strictly chemical methods. Such adherent, inorganic protective coatings on aluminum are effective in reducing corrosion and prolonging paint life. Chemical finishing methods also include the frosted finish, diffuse reflector finish, various types of etched surfaces, and chemically produced oxide coatings. Methods are available for producing a bright chemical polish on aluminum by a dipping operation. Chemical finishing processes can produce surface effects not

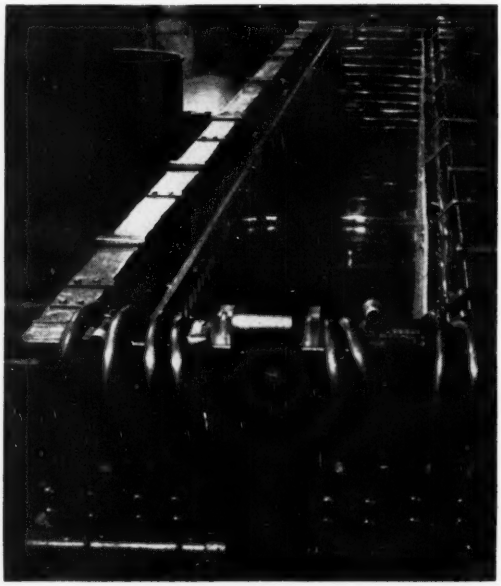
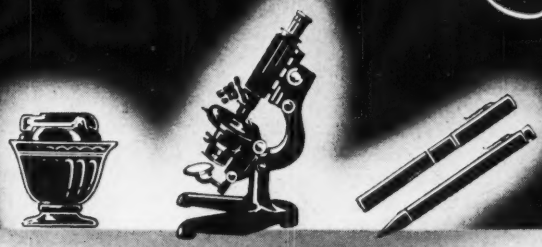


Fig. 2—A 22-foot anodizing tank for aluminum. The tank is lined with 3/16-inch lead and a total of 650 feet of lead coil was used to provide proper cooling. The coil guards are built of ⅜-inch Lucite.
*(Photo courtesy Heil Process Equipment Corp., Cleveland 11, Ohio)*

# Rhodium Plating



Rhodium is one of the six platinum group metals. It is hard and has an untarnishable brilliant white color. In electroplating, it produces beautiful results and is widely used for this purpose in jewelry — even precious metal jewelry. Its high reflectivity makes it excellent for mirrors for motion picture projectors and similar purposes. With restrictions upon usual plating metals, rhodium is the logical alternative for plating optical mounts, contacts for communication equipment, radar components, pen and pencil sets and a host of like objects.

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ical oxide coating, and formation of phosphate coating. One type of phosphoric acid-organic solvent mixture for surface treatment is made up of an aqueous solution of phosphoric acid with organic grease solvents and emulsifiers. The mixture is usually applied by brush or by dipping and probably forms a thin film of aluminum phosphate on the surface of the metal (U. S. Army Corps of Engineers Specification T-1184-D).

Oxide coatings can be produced on aluminum surfaces by certain chemical treatment processes. Patents pertaining to some of these processes have been granted to the Aluminum Company of American. One method specifies immersion of the work in a hot (150 deg. F). solution of 2 per cent sodium carbonate and 0.1 per cent potassium dichromate for a period of about 20 minutes. Pores of the oxide film thus formed are sealed by subsequent immersion in a hot solution of 5 per cent potassium dichromate and the parts are then rinsed. The absorbed dichromate neutralizes any residual alkali in the coating and tends to increase its protective power. Oxide films thus formed have been reported to vary in color, depending on the alloy treated, but are usually a yellowish green after sealing in dichromate. Oxide coatings produced by chemical means are thinner, softer and more porous than those obtained by the anodic processes previously described. However, in general they are more economical and easier to apply.

A number of phosphate coating processes for aluminum are available from a number of companies. Such a process may be carried out by immersion or spray application in the same type of equipment and with similar cycles as used for processing steel and zinc. Treatment of aluminum parts involves the following typical steps: (1) clean work thoroughly by immersion in a mild inhibited alkaline cleaner, by solvent cleaning, or vapor degreasing. (2) immerse cleaned and rinsed metal in the phosphatizing solution; (3) rinse thoroughly in cold water after treatment in the phosphate coating bath; (4) immediately after the water rinse, the work is rinsed in a dilute solution of chromic acid (sometimes a phosphoric-chromic acid mixture is used here); (5) dry parts thoroughly prior to painting. Products such as airplane sections, miscellaneous cabinets, castings, signs, and extrusions may be treated by this process in tanks, as shown in

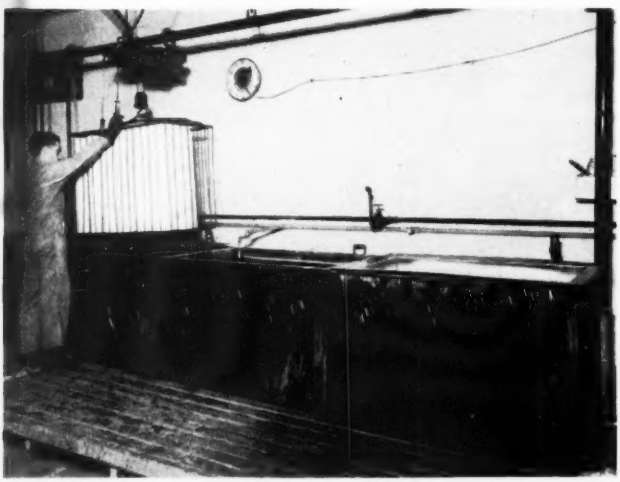

Fig. 3 — Aluminum chimney liners being dipped into "Alodine" phosphatizing bath. Airplane sections can be processed by a similar operation. *(Photo courtesy American Chemical Paint Co., Ambler, Pa.)*

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Fig. 4—Spraying is a valuable method for applying lacquer finishes in production line operations. *(Photo courtesy The DeVilbiss Co., Toledo 1, Ohio)*

Fig. 3. For the protection and paint bonding of assembled airplanes or parts for assembled building siding, gutters, and downspouts, the chemical may be applied with a large brush to surfaces previously cleaned and rinsed. The coating forms almost immediately and is then rinsed, dried and painted.

A chromate-type chemical coating for aluminum products is also available.

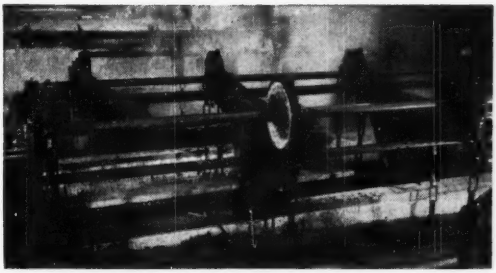
* * *

## Lacquers for Finishing Military Production

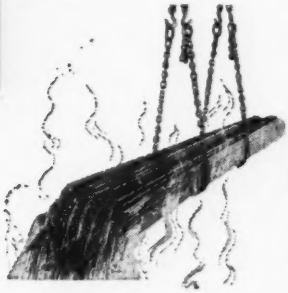
LACQUERS have certain advantages significant in finishing military production. During World War II, lacquers were used in finishing many types of war equipment including the coating of shells, bombs, and grenades for camouflage, protective and identification purposes. Such finishes were required to provide satisfactory resistance to water, gasoline, and grease as well as to corrosion. They also had to have a satisfactory degree of flexibility and good adhesion to bare metal. White lacquers were used on the inside of tanks; lacquers were used in finishing parts of armored cars, radio equipment, assault boats, aircraft, and other World War II essentials. Spraying is one rapid method of applying a lacquer finish, as illustrated by Figure 4.

The Hercules Powder Company has emphasized the fact that since World War II much progress has been made in lacquers in terms of production advantages in finishing military requirements. Also, according to Hercules, the five essential parts of lacquers—pigment, resin, plasticizer, nitrocellulose, and solvent—all have been subject to a steady process of improvement. Over the past few years, major improvements in durability and serviceability have been made, and these are now being acknowledged and translated into new and improved specifications. Economies in material and labor costs are realized using the hot spray process for application of lacquer.

The Quartermaster Corps, alone, has 76,000 items, of which approximately 25 per cent require coatings. Some of the military applications pointed out by Hercules as potential uses for lacquer, hot or cold, are as follows; ammunition, including hand grenades, projectiles, rockets, armored tanks, automotive equipment, skiis, and helmets. There are a number of existing specifications calling for lacquers for the uses listed below: camouflage for metal surfaces; corrosion preventive film for aluminum; aromatic fuel-resistant



*Former chains on these mechanical picklers used to fail in 2½ months. Monel chains are giving 1½ years' service 24 hours a day in hot, 10% sulfuric acid. Average load is 5 tons. Reduced shut-downs have increased output substantially.*



*Monel sling chains handling 4 to 5 tons of steel tubing. 75 such chains are in this plant. Where 1¼" chains of another metal failed in 9 months, these Monel chains have already served 6 years.*

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coating; automotive lacquer; gilding metal lacquer; fungus-resistant lacquers for electronic equipment; coating for shells, bombs, grenades; sealing compounds and lacquers for ammunition parts; dip-coating for reflectors; obliterating lacquer; one-coat application for metals; model lacquer.

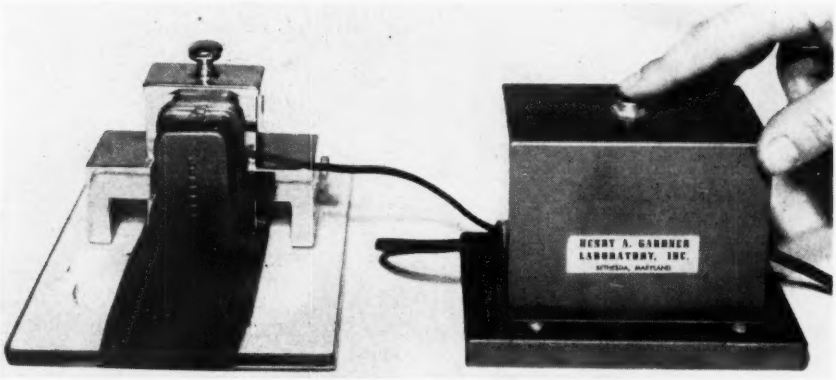


Fig. 5—Dust-free tester for organic finishes.
(*Photo courtesy Henry A. Gardner Laboratory, Inc., Bethesda 14, Md.*)

What are the characteristics of lacquer finishes which distinguish them from other types of finishing materials? First of all, lacquers are quick drying and develop good resistance to marring and print resistance in a short time. Within minutes after the spray gun has finished its work, the lacquer film is dirt free, dry and hard. This means that articles finished with lacquer can be further processed, handled, or packaged for shipment without appreciable delay. Figure 5 shows a dust free tester for organic finishes manufactured by Henry A. Gardner Laboratory. The tester was developed by the Technical Committee of the N. Y. Paint & Varnish Production Club. Maximum speed is obtained if the articles are force dried for a relatively short time at a slightly elevated temperature to assist in drying out the solvents, but these requirements fall far short of the conditions necessary for baking finishes. The speed of lacquers depends on the fact that drying involves only the evaporation of the solvents from the film.

Lacquer not only dries fast, but with hot spray application, goes on fast too. One hot spray application can approach the build of two cold spray applications. The hot spray method is making possible new production records without expanding finishing plant areas or personnel. The fact that mar resistance develops almost immediately cuts down on the chance that the finished article will be marred or spoiled before it is dry. Also tape masking for multicoloring may be done within a short time after the first color is applied. This allows straight line production of multicolored work.

Another practical advantage of lacquers is the ease with which such finishes can be patched by spraying an aditional coat of lacquer over a damaged layer. The spotting lacquer blends into the surrounding finish dissolving it to form one continuous film. This

*to page 66→*

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A 22" x 47" Platecoil gives the same heat transfer surface as 32 feet of 1½" pipe. This pipe requires a space approximately 30" x 60". Platecoil thus saves about 50% over equivalent pipe coil.

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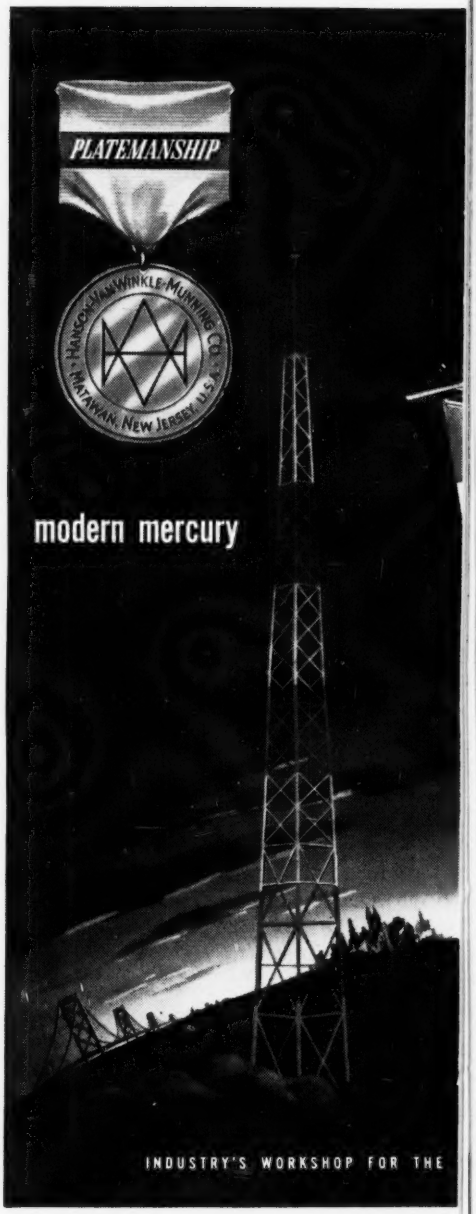

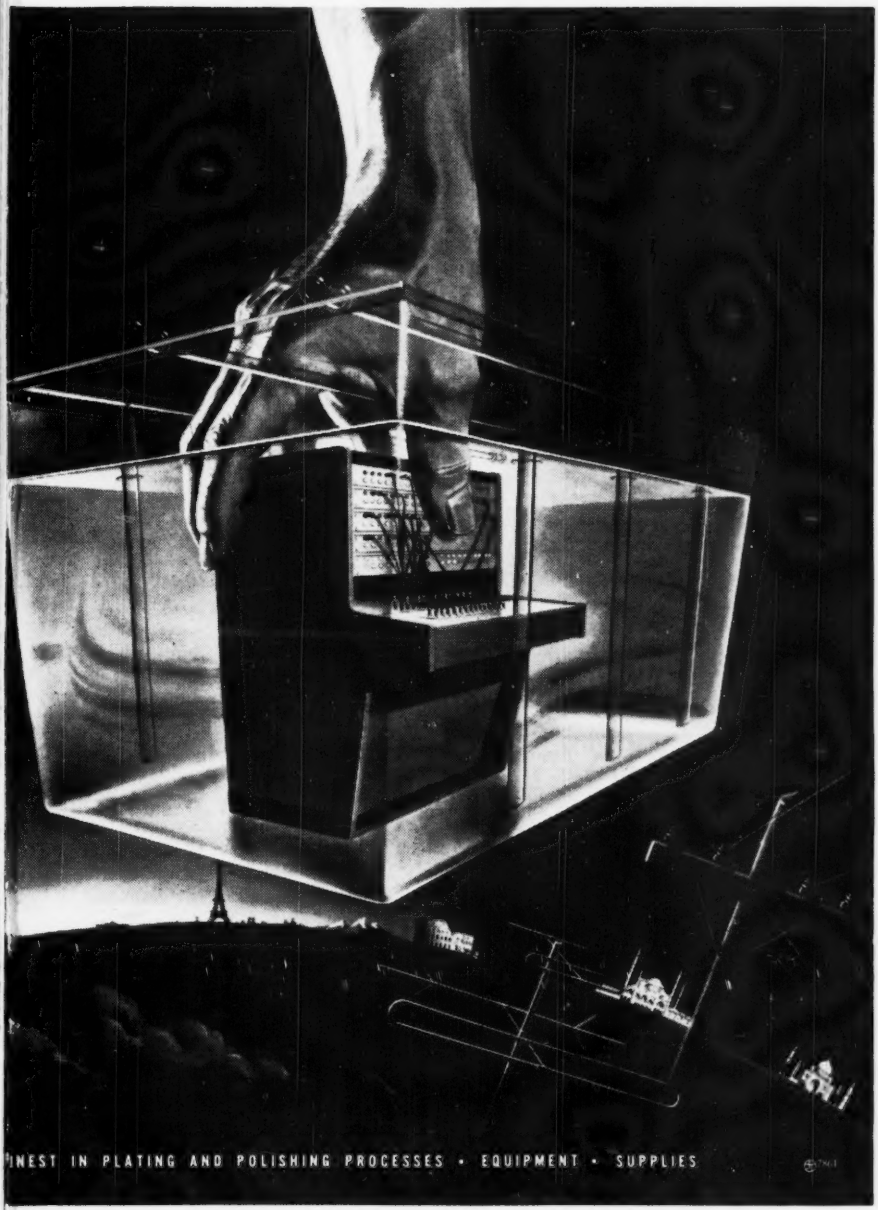
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makes it possible to repair damage to coatings in the field when necessary.

### Hot Spray Application

The hot lacquer process is a technique wherein the lacquer is heated to make it more fluid and is sprayed while hot. Users of this method find that they spend less for the finish being applied. Some of the reasons for these savings are outlined below:

1. Solids are higher and the thickness obtained for each pass is greater.
2. Solvent waste is lower. This higher per cent of solids means less solvent is needed.
3. Coverage per gallon is increased. If one gallon of lacquer, applied cold at 21 per cent solids, will finish 100 units, then one gallon of lacquer sprayed hot (30 per cent solids) will finish 143 units with the same film thickness.
4. Fewer coats are needed. Frequently three coats are required to obtain sufficient finish to beautify and protect a product. Experience has shown that by spraying hot, at higher solids, two coats will give the same amount of finish.
5. Capacity of finishing plant can be increased. As an example, reduction in number of coats from three to two is equivalent to adding 33 per cent capacity.
6. The finish has better flow-out and less tendency to sag. According to Hercules, all existing evidence indicates that heavy films flow out better than thin ones.
7. Blushing is eliminated. Studies conducted in the Hercules Laboratories showed that when lacquer is sprayed hot, instead of at room temperature, it is virtually impossible to create a blushing problem. Figure 6 illustrates the temperatures found during the spraying of a hot lacquer (162 deg. F.) using room temperature (72 deg. F.) air for atomization.

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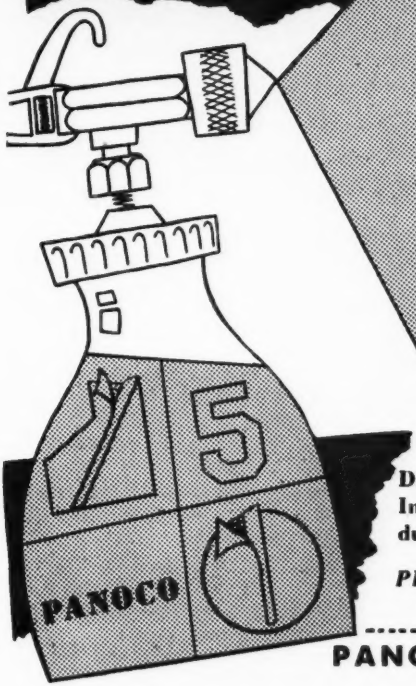


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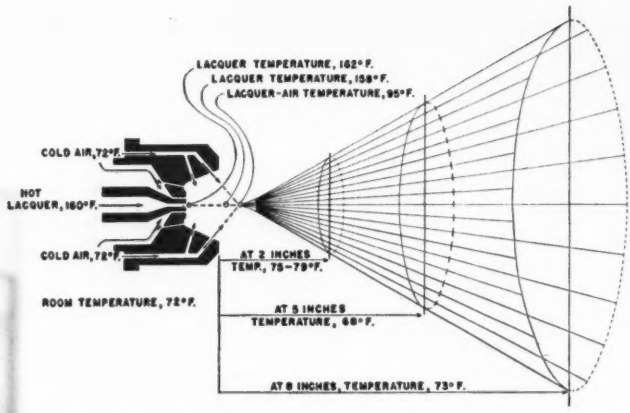
LACQUER TEMPERATURE, 162° F.
LACQUER TEMPERATURE, 158° F.
LACQUER-AIR TEMPERATURE, 95° F.
COLD AIR, 72° F.
HOT LACQUER, 160° F.
COLD AIR, 72° F.
AT 2 INCHES TEMP., 75–79° F.
ROOM TEMPERATURE, 72° F.
AT 5 INCHES TEMPERATURE, 68° F.
AT 8 INCHES, TEMPERATURE, 73° F.

Fig. 6 — In this diagram, based on studies conducted at Hercules laboratories, are shown temperatures found during the spraying of a hot lacquer. Using room temperature air for atomization, the lacquer as deposited on the target 8 inches from the gun was approximately at room temperature. This should greatly reduce chances of blushing during application of lacquer. (*Illustration courtesy Hercules Powder Co., Wilmington 99, Del.*)

### Properties of Hot Sprayed vs. Cold Sprayed Finishes

Tests have been made by Hercules to determine if applied lacquers would show appreciable differences in properties depending upon the way they might have been laid down. In carrying out these tests, three lacquers were sprayed, each to give films of three different thicknesses of approximately 1, 2, and 2.5 mils. The solids composition for each lacquer was the same; the lacquer solutions applied differed only in non-volatile amount and volatile makeup. Results of the tests indicate that lacquer films of equivalent composition and thickness show no difference in properties because of being applied by these different methods. Another important point is that when lacquers are formulated specifically for high-solids application, it is possible to use higher viscosity materials, thus providing films with greater cold-check resistance, tensile strength, and toughness, at no loss of solids.

### Spray Condition Variables

One set of conditions found satisfactory for hot-spray application of lacquer is summarized here. Whereas this combination of spray condition variables was found to give good results, others can be used.

Air Variables
- Temperature ..... room temperature
- Pressure ..... 60 p.s.i.

Lacquer Variables
- Feed-tank pressure .. to give desired flow rate
- Spray-valve adjustment .... wide open
- Temperature at gun ..... 150 to 160 deg. F.
- Viscosity at room temperature .. 160 seconds or lower by Ford No. 4 cup
- Viscosity at gun ..... below 80 centipoises
- Flow rate at gun ..... 20 oz./min.

Other Variables
- Heating unit thermostat setting ..... 170 deg. F.
- Spray target temperature .... room temperature
- Distance between gun and target ..... 6 to 8 inches

A survey recently conducted by Hercules showed that hot spray lacquer is being used in finishing such varied metal products as automotive parts, store fixtures, lighting fixtures, home furnaces, tool boxes, steel drums, wall tile, metal caskets, tin cans, aircraft equipment, scales, washing machines, and communications equipment.

*to page 72→*

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turn these jobs into full speed, profitable production runs. It's all in the right combination of equipment, contact wheels, and fast-cutting, long-lasting BEHR-MANNING Abrasive Belts. BEHR-MANNING Engineers can put you on the right track with the combination that's right for your polishing job. They'll demonstrate the latest equipment in a conveniently located BEHR-MANNING Demonstration Room or in your own shop, if you prefer. Make a date now.

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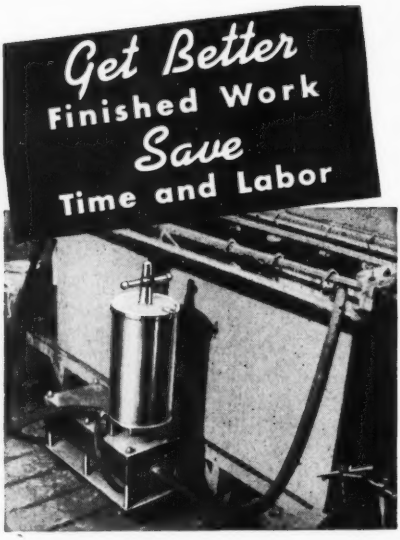


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## Mechanism of Paint Blistering in Sea Water Is Electrochemical

BLISTERING of paints in marine atmospheres has been attributed to many causes. Work conducted by W. G. O'Driscoll, Royal Naval Scientific Service, and recently reported in the "Journal of the Iron and Steel Institute" (British) has upheld the theory that this blistering, which is characteristic of the initial deterioration of paints in marine use, is electrochemical in nature. In the tests conducted, the appearance and growth of blisters were studied on panels immersed in sodium chloride solutions of approximately the same concentration as sea water. The anodic or cathodic origin of the blisters was clearly illustrated by potential plots over a blistered surface using a silver/silver chloride electrode.

O'Driscoll pointed out that the formation of blisters does not, in itself, constitute too serious a defect, as long as the paint remains intact; however, when the blisters break, localized corrosion and pitting occur on the bare metal. Breakage of the blisters is soon followed by the more general stripping of the paint with the subsequent extension of corrosion. The extent to which blistering takes place is dependent, among other factors, upon the nature of the paint and the metal to which it is applied. Mild steel is particularly subject to paint blistering in sea water. Since these effects had been found to be well defined on chlorinated-rubber based paints, the study was carried out on such a paint, pigmented with iron oxide and applied to mild steel panels. The percentage composition by weight of the chlorinated rubber paint was as follows:

60.8 volatile matter (naphtha and white spirit)
32.7 medium (chlorinated rubber)
6.5 pigment (82 per cent $Fe_2O_3$, 18 per cent siliceous matter)

The coated test panels were placed in

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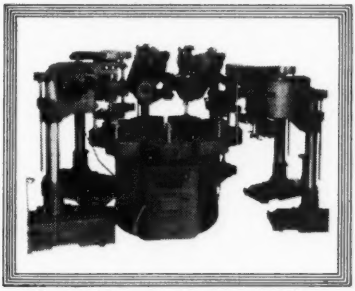

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an almost vertical position in large beakers containing the N/2 sodium chloride solution and were covered with watch glasses to prevent undue evaporation and the entry of dust particles.

Under conditions of complete immersion in N/2 sodium chloride solution at room temperature blisters became visible within 3-5 days. Growth progressed until some of the blisters broke and rust gathered on the broken blisters. Deterioration continued until the paint had undergone extensive breakdown and stripping, leaving the panel generally corroded, with pitting localized on the areas where the blisters first broke. The blisters were classified into two types, those which contain alkaline liquid and these which contain acidic liquid. Tests were conducted which showed that the former are seats of cathodic action, whereas the latter, which are associated with the presence of iron salts and the eventual appearance of rust, are anodic.

The potentials of the electrolyte over the panel were explored using two similar Ag/AgCl electrodes. One electrode fixed in a corner of the shallow tank containing N/1000 sodium chloride (used for these measurements on panels that had been immersed in the regular test solution for 3 weeks) served as a reference electrode. The other was mounted on a frame capable of transverse and longitudinal movement over the test panel. The difference in potential between the two electrodes was measured on a valve potentiometer. The evidence from these tests is that blistering is largely an electrochemical phenomenon and that acidic blisters are evidence of anodic regions, while alkaline blisters are seats of cathodic action.

O'Driscoll pointed out tnat in practice the effects obtained with other types of marine paints were similar to those obtained for chlorinated rubber, but not so pronounced. The degree of permeability of the paint film appears to determine the precise nature of the

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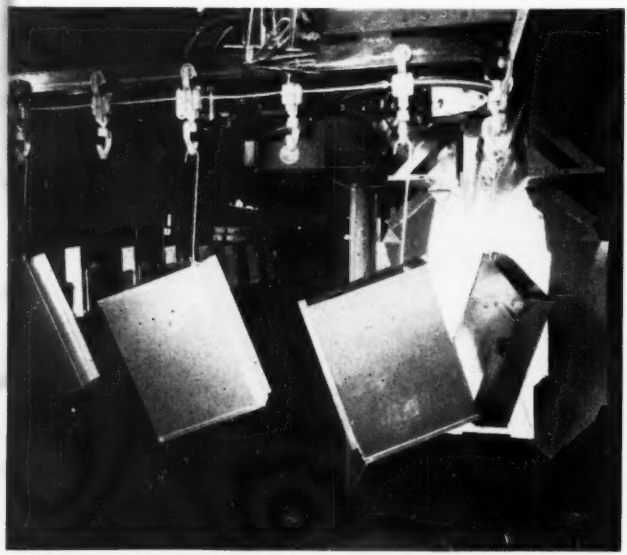
attack; the more permeable film will not retain the ions produced electrolytically, and osmotic or electro-endosmotic effects do not ensue. Furthermore, there will be a higher proportion of anodic areas on permeable media, since the effect of alkali creep will not be so aparent with lower concentrations of alkali. The overall effect leads to a more general form of breakdown. On the other hand, with paints based on highly impermeable media, such as chlorinated rubber, the results tend to be localized and show a pitting form of attack. Blisters on this type of composition only occur at weaknesses or imperfections in the film, and if care is exercised to ensure an adequate thickness of paint coating over all surfaces, preferably as several coats, the risk of failure by blistering is greatly reduced. However for permeable films the answer is not quite so obvious since it is difficult, even with adequate thickness, to eradicate the effect entirely.

* * *

## Corrosion Resistance of Anodized Titanium

STUDIES have been carried out at Tulane University by E. M. Peres, Jr., to compare the corrosion resistance of anodized titanium with unanodized titanium using various acid solutions as testing media. The results of the work, which were recently reported in a paper in collaboration with Chuk-Ching Ma in "Industrial and Engineering Chemistry", showed that titanium is readily anodized by electrolytic treatment at 20 deg. C. for 15 minutes, at 7 volts and a current density of 3.6 amp./sq. in., in a 15 per cent sulfuric



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Before this oven was installed, the parts were baked in a conventional batch-type oven for 30 minutes.

*(Photo courtesy The Fostoria Pressed Steel Corp., Fostoria, Ohio)*

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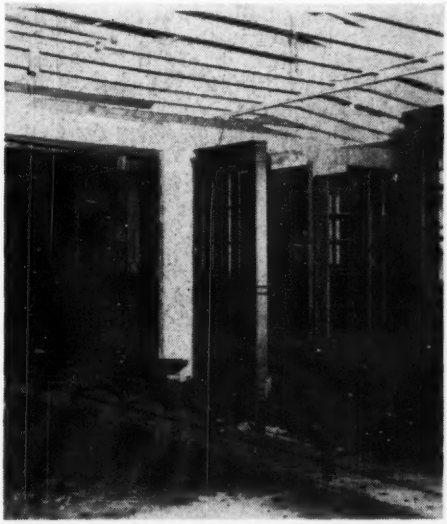

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**EVANSVILLE, INDIANA**

acid solution. This anodic treatment was stated to be superior to the dipping process for the formation of a corrosion resistant oxide film on the surface of the metal.

It was pointed out by these workers that titanium is distinguished from other elementary metals by the combination of many seemingly dissimilar and at the same time desirable properties. It represents the bridging element, for constructional purposes, between the light metals, aluminum and magnesium, and the heavy metals such as iron, copper, and nickel. It is light, ductile when pure, and corrosion resistant; it is also strong and has a melting point of 3140 deg. F. By virtue of its outstanding characteristics, together with its position as one of the most abundant structural elements on the earth's crust, titanium should become one of the primary important materials of construction. One of the objects of the study conducted at Tulane by Peres was to find a satisfactory method for anodizing titanium. Inasmuch as there was no quantitative information available on anodizing titanium, the preferred operating conditions reported for anodizing were developed as the result of a number of trials.

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Over 50 years' experience in making high-quality cotton buffs to do your job better, and at lower cost, than ever before. Let us solve your buffing problems now.
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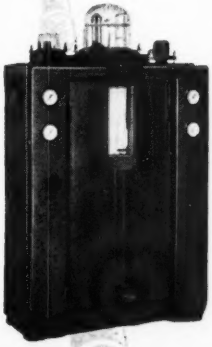
Corrosion rates were studied using the alternate immersion corrosion test at 35 deg. C., as recommended by the American Society for Testing Materials. All tests were conducted at a cycle of 2 minutes and 38 seconds for 96 hours. In addition, the behavior of anodized and unanodized metals in selected acid solutions at the boiling point was investigated by the total immersion corrosion test without aeration. The corrosion resistance of the anodized and unanodized titanium was found to depend primarily on the oxidizing or reducing tendencies of the corrosive medium in which it was immersed and not so much on the concentration of the medium. The more oxidizing the character of the medium, the more resistant was the titanium. The passivation of titanium depends upon a tight oxide film developed on the metal surface.

In oxidizing media both anodized and unanodized titanium were equally resistant to attack at all concentrations and temperatures tested. In reducing media both were readily attacked at about the same rate. In neutral media the anodized metal was at once seen to be superior to the unanodized in resisting attack by acids. The minimum observed in a corrosion rate curve for titanium in approximately 65 per cent sulfuric acid solution was caused by the slight oxidizing tendency of the more concentrated solutions. It was pointed out that the solvency power of sulfuric acid solutions toward titanium is probably due to the formation of soluble complexions. The superiority of the anodized over the unanodized samples in sulfuric acid of moderate concentration was attributed to the fact that the neutral character of these solutions does not provide an oxide film on the

# CHLORINATION *Employed...* CYANIDES *Destroyed*



The treatment of cyanide wastes is a difficult problem which is growing more acute daily. Increasingly stringent stream pollution legislation has placed a heavy demand on industry for the complete destruction of cyanides.

Effective, economical treatment of cyanide wastes requires versatile equipment and experience. The Wallace & Tiernan organization brings you both from its record of equipment installations in over 25 cyanide waste treatment plants.

A complete line of W&T Chlorinators and Chemical Feed Equipment, backed by 37 years experience in the chlorination of water, sewage and industrial wastes, is an assurance that there is always available from W&T a proven chlorinator to fit the needs of your particular cyanide waste problem.

Write today to arrange for a visit from your W&T Representative or for technical bulletins on cyanide waste treatment.

S-63a

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**COMPANY, INC.**
CHLORINE AND CHEMICAL CONTROL EQUIPMENT
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unanodized samples, and yet does not interfere with the protective film on the anodized ones. The workers reported that further studies are being conducted on the anodization process for titanium to develop more fully its usefulness as a corrosion resistant coating.

* * *

## Acid Recovery in Continuous Strip Pickling

THE possibility of acid recovery from continuous strip pickling lines has recently been investigated in studies conducted by the British Iron and Steel Research Association. Details of the basis upon which calculations can be made to maintain a balanced system for this method, which involves the removal of ferrous sulfate, and the return of the mother liquor, with its associated free acid, to the pickling tanks, were given by J. Pearson and W. Bullough in "The Journal of the Iron and Steel Institute (British)." In addition to reducing the consumption of acid, the return of mother liquors may represent a big saving of water. The separated ferrous sulfate requires disposal, but in general this should be easier than disposing of spent liquors.

The acid concentrations at the inlet and outlet ends of a pickling line should be chosen so that the required hourly tonnage of steel strip can be properly pickled. These concentrations depend on the nature of the scale and any processing (scale breaking) it may have received, and should be determined by experiment or by reference to lines pickling similar material. In the outlet liquor, to avoid deposition in the pickling tanks, the concentration of ferrous sulfate must be such that its solubility is not exceeded. Even a value approaching the solubility limit may be too high, since the presence of dissolved ferrous sulfate reduces pickling rates, except at very high acid strengths. In the cyclic system described by Pearson and Bullough, the ferrous sulfate may be crystallized as copperas ($FeSO_4.7H_2O$) by cooling, or as monohydrate ($FeSO_4.7H_2O$) by removal of water at temperatures above 140 deg. F. Even on cooling, monohydrate is deposited if the acid concentration is too high, so that the form produced and therefore the type of crystallization equipment necessary, cannot be decided without a knowledge of the acid and ferrous sulfate concentartions at all stages in the cycle.

The inlet and outlet liquor rates and ferrous sulfate concentrations depend on the amount of acid consumed in pickling, on the amount of dilution and the difference between the inlet and outlet acid strengths. Also, the inlet liquor rate varies with dragout, whereas the outlet rate does not, and, as would be expected, the inlet and outlet ferrous sulfate concentrations are interdependent.

Since it is possible to add sulfuric acid required either before or after the removal of the ferrous sulfate and since also the ferrous sulfate may be produced in the form of copperas or monohydrate, Pearson and Bullough point out that four possible methods of treatment may be considered. They are as follows: (1) addition of acid before cooling to crystallize copperas; (2) addition of acid before crystallization of monohydrate; (3) addition of acid to mother liquor after removal of copperas; (4) addition of acid to the mother liquor after removal of monohydrate. The investigators pointed out that (2) and (4) can generally be arranged to work, but (1) and (3) may be impossible if adequate cooling temperatures cannot be reached.

*"Paw sez ef VEDOC Defense Paint is good fer Army bombs an' rockets it should be jest right fer corn-squeezin's."*

We don't go along with Paw's use of *Vedoc* Defense Paint here. But for Defense Contracts you have—or may get—our government specification finishes will fill the bill. Our World War II experience, combined with postwar research and increased facilities, enables us to offer you the best in Defense Paint. Your orders receive our prompt attention—whether they're for gallons or drums. Write today for samples and prices!

***Remember, Ferro Is Set Up to Provide Complete Organic Coatings Service. From the Development of Diversified Protective Coatings—to the Designing and Installing of Efficient Finishing Oven Systems.***

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LIQUID PLASTICS DIVISION

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# NEWS of the Industry

## NEW PLANTS

About three years ago, **THE LEA MANUFACTURING CO.**, Waterbury, Conn., located for many years in leased space at 16 Cherry Avenue, began its long-planned expansion program, by purchasing a large plot with railroad siding on the west side of the city toward Watertown. The first building, with some 10,000 feet of floor space, was laid out for storage purposes, the company handling a large tonnage of resale items used in plating and finishing plants. Also, the new building furnished much better storage space for its own raw materials needed in the manufacture of Lea Compounds, Learok, Leabrasive, and other Lea products.

Because of increased business the company started the construction of the second unit in the project, a 22,000-square foot plant now in production, where the line of Lea Liquabrade Compositions, copper, cadmium, and nickel brighteners, and the extensive line of Learok composition are being manufactured.

Three more buildings are projected: additional storage space; the Lea Compound plant; and laboratory and office.

---

A plant designed for the manufacture of Selectron, a polyester resin plastic, is under construction at Springdale, Pennsylvania, according to an announcement by E. D. Griffin, vice president in charge of **PITTSBURGH PLATE GLASS COMPANY'S PAINT DIVISION.** The resin producing plant will adjoin Pittsburgh's ultra-modern paint manufacturing facility.

After seven years' research at its Milwaukee laboratories, Pittsburgh Plate

The large building in the foreground is the second of an extensive project being carried on by the Lea Manufacturing Company at Waterbury, Connecticut.

began production of Selectron resins during 1943 at Milwaukee. A highly versatile product, it was utilized as the impregnating agent in war products where a lightweight, bullet-resisting and weather-resisting material was needed.

---

Beginning the second major step in the development of its Calvert City, Kentucky works, the **PENNSYLVANIA SALT MANUFACTURING COMPANY** has announced it will add new facilities, including an electrolytic chlorine-caustic soda unit.

Addition of the unit will combine at one works four basic chemicals—hydrofluoric acid, sulfuric acid, chlorine and caustic soda, the first combination of these four products in one works in the United States.

---

The purchase of a factory building, located at 1521 E. Grand Ave., El Segundo, Calif., has been announced by **INTERNATIONAL RECTIFIER CORPORATION.** The plant now occupied at 6809 S. Victoria Ave., Los Angeles, will be maintained for research and development. General sales and administrative offices will be located at the new plant in El Segundo.

A year ago, the increasing demand for International Selenium Rectifiers forced the addition of a second story to the Los Angeles plant, which doubled the floor space. It has now become necessary to redouble factory capacity to maintain constantly growing delivery schedules.

## COMPANIES

All equipment, machinery, inventory, formulas, and so on, of the **KAY & ESS CO.**, Dayton, Ohio, have been sold to the Moran Paint Company, also of Dayton, whose plant was destroyed by fire September 24. Kay & Ess will change its name to **PIRM, INC.**, and will act as a landlord leasing its property to Moran.

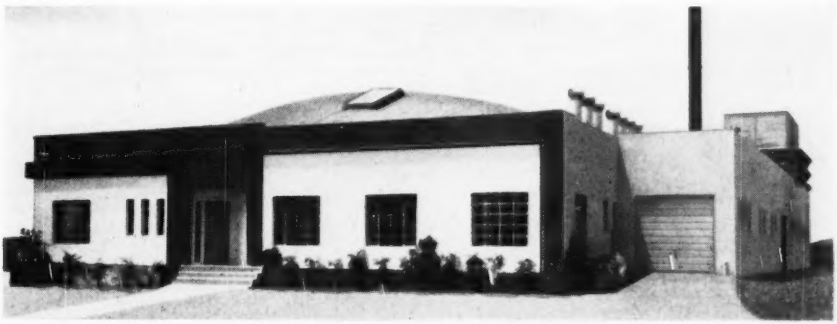
The Kay & Ess Company, which celebrated its golden anniversary in July 1950, was founded by Arthur M. Kitteredge, and his son. Located on the Baltimore & Ohio Railroad with its own siding, its sixteen buildings on seven acres of land provide both adequate storage and manufacturing space.

---

The appointment of American Mineral Spirits Company distributor of MD Aluminum Pastes and MD Gold Bronze Powders has been announced by **METALS DISINTEGRATING COMPANY, INC.**, Elizabeth, N. J., manufacturer of metal pigments, metal powders, and metal abrasives.

The territory covered by this appointment includes the New York area, New Jersey, eastern Pennsylvania, Maryland, Delaware, and the District of Columbia.

Daniel G. Hereley Company, Chicago, has been appointed distributor of MD Aluminum Pastes and Powders and MD Gold Bronze Powders by the METALS DISINTEGRATING CO., INC., Elizabeth, N. J. The territory included in this appointment covers the northern parts of Illinois and Indiana.



New plant of the International Rectifier Corporation

# KEEP SPRAY BOOTHS SAFER FROM FIRE!

**WITH NON-INFLAMMABLE**

# BOOTHCOTE #4

**FOR DRY WALL BOOTHS**

**AND THE NEW**

# BOOTHCOTE #5

**FOR WATER WASH BOOTHS**

Makes frequent cleaning easy. Pre-mixed, ready to use, safe to store. Saves time, labor, no flaking off. Spray or brush on clean booth. When desired, operator peels off overspray in sheets. Advocated by insurance companies.

**Money-back trial offer: 5 gals. $6.25**

## HYGRADE'S STERLING CREME

protects hands and arms from paint, grease, ink, etc. penetrating skin. Soil washes off easily without harsh solvents or cleaners.

**40 lb. pail $12.**

## HYGRADE'S STERLING CLEANER

dissolves grease, grime, fresh paint, tar, printers' ink, shellac, mastic cement, etc. without water.

**40 lb. pail $7.50**

*All prices f.o.b. Buffalo*

# HYGRADE

**FOOD PRODUCTS CORP.**

**Industrial Div., 18 Stetson St., Buffalo 6, N. Y.**


Also appointed was J. W. Copps of Milwaukee, who will be representative for most of Wisconsin and the north peninsula of Michigan.

---

**LASALCO INC.**, 2828 LaSalle St., St. Louis 4, Mo., has been appointed distributor for Promat Division, Poor & Co., Waukegan, Ill., manufacturer of chemicals for the electroplating industry. The Promat line to be handled by Lasalco includes zinc, cadmium, copper, and brass electrolytes and addition agents.

---

**SOLAR AIRCRAFT CO.**, San Diego, Calif., and **FERRO CORP.**, Cleveland, Ohio, have joined forces to combat the critical metals shortages threatening the U. S. defense program.

High temperature ceramic coatings that enable low-carbon steels to last as long and perform as efficiently as high-alloy metals are now available to industry through Ferro, producer of raw materials and furnaces for the porcelain enameling industry, who has been given exclusive license to manufacture, market and service the coatings developed by Solar.

According to C. D. Clawson, Ferro president, use of the ceramic coatings in scores of industries concerned with defense production can greatly reduce the demand for nickel, chrome and cobalt, since they require no critical materials. Solar has developed 200 versions of the coatings for metals in both low and high-temperature ranges, thus opening a broad field of applications.

Tests have proven that coated low-carbon steels have equal life and performance characteristics as uncoated high-alloy steels and coated high alloy steels provide greatly expanded life and performance characteristics.

---

The Canadian business of the American Air Filter Co., Inc., Louisville, Kentucky, is now being handled by **AMERICAN AIR FILTER OF CANADA, LTD.**, Montreal, P. Q. Wm. G. Hole, formerly of Darling Bros., Ltd., will be in charge of all Canadian operations.

Representatives will be established in the larger Canadian cities to handle the AAF line of air filters, electronic precipitators, and Roto-Clone dust collectors.

**...While Removing Oxide Scale Quickly and Completely**

Nopco 1067-A has a unique ability to reduce surface tension in mineral acid solutions. This means it affords *high drain-off* of the acid solution during pickling, resulting in appreciable savings of sulfuric acid in pickling baths.

In addition, Nopco 1067-A permits complete acid removal to be achieved with fewer rinsings, and reduces the possibility for acid contamination during operations following pickling.

In a word, the addition of this unusual liquid surface tension depressant to acid solutions offers the following important advantages:

**Savings of sulfuric acid solution**—since, on the average, carry-over losses can be cut 30% to 40% . . .

**Savings in time and labor**—since better drain-off means fewer rinsings . . .

**Savings in operations following pickling**—since thorough acid removal prior to such operations prevents contamination of lubricants, and thus increases life of dies and other tools . . .

**PLUS** faster, deeper, and more uniform penetration of oxide scale.

In the light of current restrictions on the use of sulfuric acid, you'll find Nopco 1067-A exceptionally helpful in any type of acid pickling—plating, wire manufacture, galvanizing or anodizing.

Mail us the attached coupon today. We'll be glad to supply you promptly with full information.

*Reg. U. S. Pat. Off.

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Please send me full information about Nopco 1067-A

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## NEW POSITIONS

**RICHARD L. HUBER** has been named manager of the Cleveland office of the Cellulose Products Department of Hercules Powder Company. In making the announcement, the chemical company added that the office, located at 925 Euclid Avenue, Cleveland, will be an independent branch office. The area now under Mr. Huber's supervision will include Cleveland, Akron, and Pittsburgh.

A graduate of Pennsylvania State College, Mr. Huber became associated with Hercules Powder Company in 1942. He has represented the Cellulose Products Department in Cleveland since December 1946, when he transferred from Detroit.

---

**DONALD A. KING** has joined Pennsylvania Salt Manufacturing Company's sales-service organization in the industrial chemicals department, it was announced by Donald Macfarlan, Jr., district sales manager.

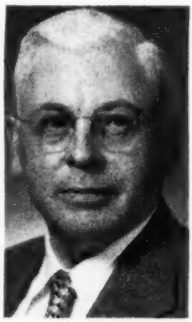
Mr. King will make his headquarters at the company' sales office in Detroit and has been assigned to that territory.

NALCO
Infra-Red UNITS
Speed Industrial Drying, Baking and Heating
Engineered for production use, Nalco Infra-Red Lamps with long-lasting carbon filaments give less glare, more penetrating heat . . . assure completed jobs at a faster rate—and at a much lower cost
From single units, strips and portable units to banks and ovens, Nalco Infra-Red Lamps and units can be "tailored" to speed up your production.
Write for "Drying Problems Made Easy"
NALCO INFRA-RED DRITHERM
NORTH AMERICAN Electric Lamp Co.
1020 TYLER ST.
ST. LOUIS 6, MO.


A native of River Rouge, Michigan, he is a graduate of Michigan State College, where he earned his B.S. degree in chemistry. He is a member of the American Water Works Association.

---

**DR. A. LLOYD TAYLOR** has been appointed director of research in the research laboratories of MacDermid Western, Inc., Ferndale, Michigan, where he will work in the field of industrial detergents for use in the field of metals.



Dr. A. Lloyd Taylor

He was formerly director of the Department of Chemistry of Pease Laboratories, New York; director of research of Oakite Products, Inc.; and vice president in charge of research and development for H. L. Shaw and Sons, Inc. More recently, he held the position of research supervisor for Wyandotte Chemicals Corporation. Dr. Taylor is a member of the American Chemical Society and the American Institute of Chemists.

MacDermid Western, Inc., is a subsidiary of MacDermind Inc. of Waterbury, Conn., and will manufacture the complete line of MacDermid products for metal cleaning and electroplating.

---

The National Chemical & Plastics Co., Baltimore 31, Md., manufacturer of lacquers and lacquer products, has announced that **ARTHUR MANDELL** has joined its sales staff and will represent the company in the New England area.

Mr. Mandell, who is well known in the industry, will make his headquarters at 27 S. Crescent St., Brighton 35, Mass.

---

Dr. E. B. Gallaher, president, Clover Manufacturing Co., Norwalk, Conn., has announced that **THEODORE R. TREADWELL** has been appointed sales manager of the company's entire line of products,

# NOW-Get All These Advantages of a NON-FOAMING WATER WASH

## PELRON'S CLEARWASHES WILL NOT FOAM!

CLEARWASH 370 used in water curtain spray booths will float over 90 percent of the oversprayed paint, as well as eliminate foam in the spray booth. Oversprayed paint is conditioned not to clog the circulating system nor to adhere to the booth walls. Economical in that its first cost is low, a little goes a long way, and much expense is saved in cleaning reservoirs, pipelines, booth walls, etc. Details in Technical Bulletin 129.

## ARE YOU ACQUAINTED WITH PELRON'S AIDS AND SERVICES TO THE FINISHING DEPARTMENT?

**EMULSION CLEANERS**
New principal — partly emulsified soil floats away. Fast, economical, safe.

**STRIPPERS**
Cold stripping of lacquers, japan, baked enamels. Fast, safe, economical.

**PHOSCOTE**
Cleans and phosphates in one operation. Economical to use on steel or aluminum. Increases paint-adherence.

**TECHNICAL BULLETINS**
Complete details of application methods for all cleaning and surface preparation materials.

## TELL US YOUR PROBLEMS . . . WE WILL RECOMMEND THE CORRECT PELRON PRODUCTS TO SOLVE THEM

# PELRON CORPORATION

7740 W. 47TH STREET, LYONS, ILLINOIS

CHICAGO • DETROIT • CLEVELAND • BUFFALO • SOUTH BEND
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including both coated abrasives and grinding and lapping compounds.

A graduate of Rutgers University and the Harvard School of Business Administration, Mr. Treadwell has had considerable experience in the abrasives industry. For several years he was associated with Divine Brothers Co., Utica, N. Y., as Chicago district representative.

---

At a recent director's meeting, **ALAN R. BURMAN** was appointed to the board of directors and the position of vice president of the Cro-Plate Company. Mr. Burman will take over the management of all sales activities, including advertising and sales, together with the development of new markets. He replaces the late T. L. Brantly, Jr., on the board of directors.

Alan R. Burman

The Cro - Plate Company manufactures wet-blasting equipment, complete hard chrome plating units, and is one of the largest complete hard chrome plating plants in New England.

---

**KENNETH F. EBBESON,** sales engineer, Norton Co., Worchester, Mass., will assume the duties of **DAVID H. PAUL,** abrasive engineer, covering Arkansas, western Tennessee, Mississippi, and Louisiana, according to an announcement by Fred L. Curtis, sales manager.


**CHEMSTEEL** CONSTRUCTION COMPANY, INC.
301 Chemsteel Bldg., Walnut St., Pittsburgh 32, Pa.

Send data on Engineering & Construction facilities for
**ACID-ALKALI-PROOF CONSTRUCTION**
of processing & storage tanks & flooring in
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Mr. Paul has been called to active duty as a lieutenant in the U. S. Navy. He spent three years in the last war in the submarine service.

According to Charles B. Price, district manager, Pittsburgh, **RICHARD J. KERVICK** was appointed abrasive engineer in West Virginia. He will take over this territory which has been recently handled by Charles B. Martin.

---

**W. H. WEBB** has been appointed sales manager of alkali products for Detrex Corp., Detroit 32, Mich., according to an announcement by A. O. Thalacker, vice president and general manager.

W. H. Webb

In the past ten years, Mr. Webb has advanced through the positions of assistant manager, Alkali Division, assistant national accounts manager, and central region manager. He has had wide experience in the plating and metal cleaning fields.

---

The Sharpe Manufacturing Co., Los Angeles, Calif., has announced the appointment of **EARL BRIGGS** as plant manager and head engineer of the company.

A mechanical engineer graduate of the University of Michigan, Mr. Briggs' background in the air compressor and paint spray equipment field makes him well qualified for this position. His service includes seven years with the DeVilbiss Company and four years with the Binks Manufacturing Company working as a sales engineer.

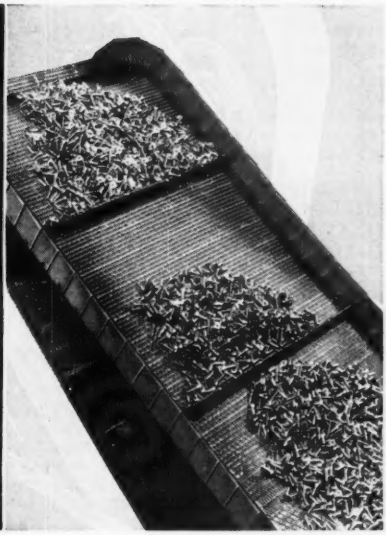
---

Renshaw Smith, Jr., vice president in charge of trade sales for the Vita-Var Corporation, paint manufacturer in Newark, New Jersey, has announced the appointment of **RAYMOND S. KERIN** as the Eastern district sales manager.

Mr. Kerin will supervise and develop trade sales in New Jersey, New York,

# Put the FREEZE On Heat Processing Costs

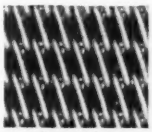
## with a CAMBRIDGE WOVEN WIRE CONVEYOR BELT



If your product must be heated in any way during production . . . there's a Cambridge woven wire conveyor belt to help you reduce costs by combining processing with product movement through the heating cycle.

For example, this photo shows a Cambridge Quench Tank Belt. Other belts may be used for heat processing in temperatures up to 2100° F . . . from drying ovens and baked paint finishes through annealing, hardening and brazing.

The moving belt eliminates manual handling, helps maintain product uniformity. All-metal construction gives longer belt life and lower maintenance costs. Open mesh of the belt allows free circulation of heat within the heating chamber, free drainage of solution in wet heat processing. Special side or surface attachments to hold the product during processing are available to meet your individual requirements.



Cambridge Duplex Weave

Cambridge belts can be woven from any metal or alloy, to any mesh or weave. Next time you have a conveyor belt problem, call in your Cambridge field engineer for his experienced advice. Write direct or look under "Belting-Mechanical" in your classified telephone directory.

**FREE BELT MANUAL includes information on conveyor and conveyor belt design, metallurgical data and belt maintenance. Write for your copy today.**

## The Cambridge Wire Cloth Co.

WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS

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Cambridge 1, Maryland

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

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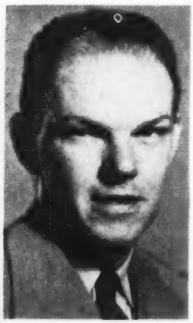
---

Cowles Chemical Co., Cleveland, Ohio, has announced the appointment of **DON WEAVER** as technical man in its Metal Cleaner Department for the Indiana-southern Ohio territory. This appointment is part of Cowles' expansion program to cover more completely the metal cleaning market.



Don E. Weaver

Mr. Weaver attended Ohio State University and the University of Cincinnati before entering production work and enamel and pickle control work for a stove manufacturer in Ohio. Previous to coming with Cowles, he was employed by a large stove manufacturer in the State of New York in a supervisory capacity for metal cleaning preparatory to porcelain enameling.

---

**EDWARD R. TALONE,** formerly in the plant engineering department of the Fairchild Aircraft Co., Hagerston, Md., is now associated with the John P. Clark Company, and will cover the States of Virginia, Maryland, and North Carolina, as well as the District of Columbia.

Edward R. Talone

In his new capacity, Mr. Talone represents the interests of the John P. Clark Company, exclusive sales representative for Ajax Electric Company, Industrial Ovens, Inc., Delaware Tool Steel Corporation, Dings Magnetic Separator Company, and Sta-Warm Electric Co.

---

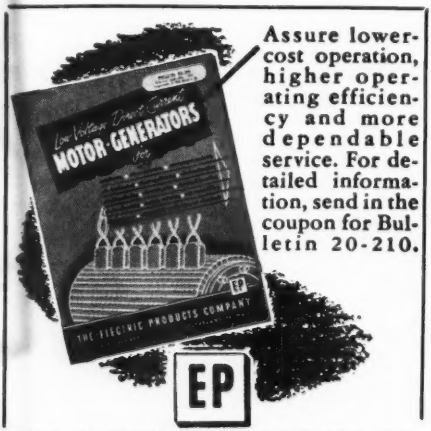
**L. F. KAUTZ,** formerly director of the Newark, New Jersey paint, varnish, and lacquer laboratory for Sherwin-Williams Company, has been appointed assistant general superintendent of the Newark plant. Mr. Kautz has been affiliated with the company for 15 years.

Succeeding him as director of the Newark laboratory is **E. S. STOUT.** A graduate of Ohio University, Mr. Stout has 14 years of technical experience in the coatings industry, both with Sherwin-Williams and the U. S. Navy. He has served the company since 1936.

---

Promotion of **DR. J. O. HENDRICKS** to the newly-created post of associate director of the Minnesota Mining & Manufacturing Company central research laboratories was announced recently by Dr. H. N. Stephens, central research director. Dr. Stephens also named **DR. MATTHEW W. MILLER** and **DR. H. M. SCHOLBERG** assistant directors.

Dr. Hendricks joined 3M in 1936 after receiving his doctorate at the University of Illinois. He became head of the firm's


Assure lower-cost operation, higher operating efficiency and more dependable service. For detailed information, send in the coupon for Bulletin 20-210.

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NAME_____

TITLE_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

X-73

# UNDERCOVER AGENT!

Both steel boxes were top-coated with the same high-grade enamel; both had been cleaned thoroughly before finishing . . . but one had been primed with STANTITE. Then both were subjected to a salt spray under laboratory test conditions: after 93 hours the first box showed 75% rust failure—but the STANTITE-primed box showed no film failure after 500 hours!

Besides preventing corrosion and rust creep STANTITE Spraying Primer and STANTITE Clear Primer (for dipping) provide excellent adhesion to all types of surfaces . . . may be used with most types of top coats. Created for application under air-dried or baked finishes, STANTITE dries rapidly, is unimpaired by any baking schedules.

Find out now what STANTITE can do for your product . . . for complete information write today to the Stanley Chemical Company, 31 Berlin St., East Berlin, Conn.

STANLEY

*Industrial Coatings*

**STANLEY CHEMICAL**

LACQUERS SYNTHETICS JAPANS ENAMELS

organic chemistry section in 1942 and a year later took charge of the colloid section. He was an assistant director of the central research laboratories since 1947.

Dr. Miller also received his doctorate at Illinois. Following service with the Army, he did scientific investigation work in Germany for the War Department. In 1947 he succeeded Dr. Hendricks as head of the organic section.

Dr. Scholberg joined 3M in 1944 and has headed the electrochemical section since 1948. In his new position he will head the inorganic section and will develop a new physical chemistry section. He received his doctorate from the University of Chicago in 1938 and later did research work for Sherwin-Williams and American Can Company.

---

R. P. Ganchan

**R. P. GANCHAN** has been appointed to head activities of ARCO Rubber Processors, new Houston plant, a division of Automotive Rubber Co., Inc., Detroit, Mich., according to announcement made by Tim G. Meulenberg, president of the parent company.

Mr. Ganchan will have complete charge of the manufacturing and sales activities of the new operation which occupies the premises of the former Texas Tank Company of Homestead Road. He was graduated from Rice Institute in 1940 with the degree of mechanical engineer. Following service with the armed forces, he became associated with Standard Brass and Manufacturing Company as sales engineer.

---

**LUIS E. ECKELMANN,** manager of the Metal Finishing Division, has been elected vice president of the Pyrene Manufacturing Co., Newark, N. J. He will be in general charge of development work as well as of metal finishing.

In April 1916 Mr. Eckelmann, while still a student at the Polytechnic Institute of Brooklyn, New York, joined Pyrene to do part time research, and following his graduation in June of that year, he became a full time member of the staff. He is recognized nationally as an expert in electrochemical problems.

---

The Williamsville Buff Division of The Bullard Clark Co., Danielson, Conn., has announced the appointment of **WALLACE MacMASTER, JR.** as direct sales and service engineer for the plating and polishing trade in the Ohio area.

Mr. MacMaster, who is a graduate of the University of Pittsburgh, served in the U. S. Navy in World War II.

## TRAINING COURSES

The next training course on appearance measurement, conducted by Richard S. Hunter and the staff of the **HENRY A. GARDNER LABORATORY, INC.,** Bethesda, Md., will be the week of February 11-15.

Consisting of lectures, laboratory work, and individual discussions, it is an educational course designed to help technologists measure color, reflectance, gloss, and other appearance attributes of materials. Emphasis is on the fundamental, optical, and psychological factors which cause materials to appear as they do, and on the measurement of these factors.

---

The **SCHOOL OF SPRAY PAINTING** operated by the DeVilbiss Co., Toledo 1, Ohio, continues to offer tuition-free instruction in industrial spray finishng methods, according to an announcement of the following schedule of classes for

# magic . . .
# in your hands

This book, in your hands, may well solve all your problems of BLACK OXIDE finishes for metal.

Here is data on tanks, temperatures, cleaners—and the facts about BLACK MAGIC Type A BLACKENING SALTS.

This new BLACK OXIDE finish easily blackens heat-treated pieces, uses less salt, operates at a lower temperature, requires no rectification by cyanide additions, requires only one tank, one salt.

**BLACK MAGIC MEETS GOV'T SPECS 57-0-2C Type 3, 51-70-1A Finish 22.04, AMS 2485 and all other black oxide specs.**

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**QUALITY PRODUCTS OF CHEMICAL RESEARCH**

At the DeVilbiss Company's School of Spray Painting, the classroom activity shown is combined with actual spray finishing practices in the one-week courses now being announced for the first half of 1952.

the first half of 1952: Weeks starting February 11, March 24, April 21, May 19, and June 23.

The school, which is maintained for users of DeVilbiss equipment, offers week-long classes for training in the theoretical and practical phases of spray painting. By means of lectures, visual education and actual use, "students" are taught the proper coordination of equipment and correct technique of spraying.

Applications may be made now for enrolling foremen, spray operators, shop superintendents, and any others who wish to attend.

## SOCIETIES

The **ANNUAL EDUCATIONAL SESSION** of the **PHILADELPHIA BRANCH, A.E.S.,** was held November 19, 1951.

First speaker on the program was Dr. William Blum of the National Bureau of Standards whose subject was "Summary of Electrodeposition Researches at the National Bureau of Standards." Dr. Blum summarized the highlights of 38 years of research by his group in electroplating, and described in detail the background, development, and applications of the following contributions of the Bureau: During World War II the chrome plating of gun barrels and the use of substitute materials for scarce nickel, outdoor exposure tests, the Magnegage, Module Method for determining adhesion, contractometer, the physical properties of electrodeposited nickel and chromium, the Haring Cell for measuring polarization and throwing power, the calculation of primary current distribution, applications of radioactive isotopes, and the deposition of unusual metals, such as molybdenum, tungsten, vanadium, aluminum, titanium, and zirconium.

Gordon Mustin, Bureau of Aeronautics, Navy Department, spoke on "Plating and Surface Treatment in Naval Aircraft." He listed the four types of corrosion hazards to which naval aircraft are subject, and then discussed the cleaning and pickling requirements and specifications for various metals.

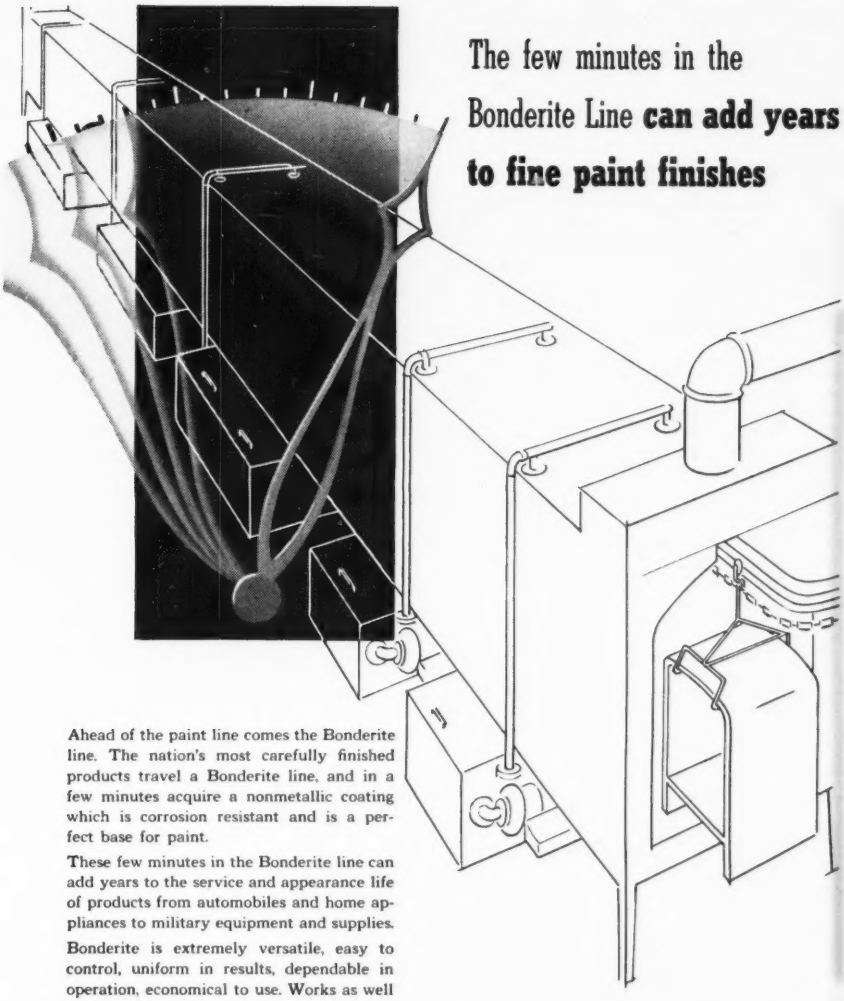
In a detailed discussion of the specific applications of various plated coatings, Mr. Mustin stated that the channel-type porous chrome is preferred over the pin point type; nickel is used for corrosion resistance, especially at high temperatures; tin and cadmium are plated separately, and then baked to give an alloy coating which provides corrosion resistance to the inside of an engine; and tin, lead, indium, cad-indium, and copper are applied for anti-galling purposes.

Also discussed were the applications of the various surface treatments of aluminum, such as conversion coatings, anodizing, chromic acid wash, and so on.

While most specifications require the salt spray test, this test is on its way out for many coatings. For anodized coatings, it will be replaced by coating weight.

The new HAE treatment of magnesium has extraordinary corrosion resistance and many other advantages. Some disadvantages are spalling on bending and decrease in fatigue resistance of the magnesium.

Third speaker was C. F. Nixon, director of the Process Development Section of the General Motors Corporation. Entitled "Decorative Chromium Plating Without Nickel," this talk was a progress report of findings in the development of suitable finishes for automobiles. Four cycles are now in use: (1) more copper,



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***BONDERITE***—corrosion resistant paint base

***BONDERITE and BONDERLUBE***—aids in cold forming of metals

***PARCO COMPOUND***—rust resistant

***PARCO LUBRITE***—wear resistant for friction surfaces

Speakers at the Annual Educational Session of the Philadelphia Branch: (left to right) C. F. Nixon, president, A.E.S.; Clarence E. Boerckel, chairman, Educational Session; Dr. William Blum, Gordon Mustin, and Alfred H. Pope, president of the Philadelphia Branch.

less nickel, chromium, lacquer; (2) copper, no nickel, chromium, lacquer for outside use, no lacquer for inside use; (3) zinc, chromate bright dip, lacquer; and (4) copper, white brass, chrome, lacquer for outside use, no lacquer for inside use.

The following are additional notes regarding the above four cycles:

1. For outdoor use, the thickness of nickel is 0.0003 to 0.0005 inch with a total thickness of 0.0015 inch; for indoor, the thickness is 0.0002 to 0.0003 inch. The application of wax preparations or oil by the owner on outdoor plating is being recommended.

2. The elimination of nickel has lost the self-leveling action of this metal, with the result that the steel must be buffed better.

3. This cycle is now extensively used both on zinc die castings and on steel. The color, however, is different than chrome.

4. This cycle is used on automobile parts to a small extent. The white brass is a development of the Oplinger bath and now consists of 5 to 25 per cent copper; the rest is zinc. The deposit has self-leveling properties and can be readily chrome plated. Addition agents are required for brightness. The present specification on the white brass is 0.0002 to 0.0003 inch. They are at present working to improve the stability of the bath with respect to brightness and self-leveling properties and to eliminate brittleness and hairline cracks which may develop when the lacquer is baked to 750 degrees Fahrenheit.

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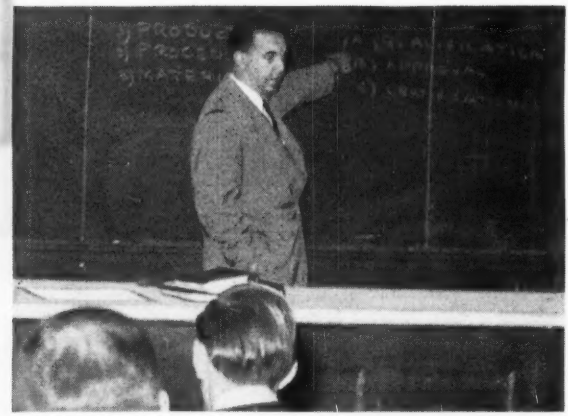
At a regular meeting of the Masters' Electro-Plating Association, Inc., held on November 14, 1951, **S. C. TAORMINA** was elected executive secretary to succeed the late Mr. Bregman.

Mr. Taormina is personally well-known to the members of the association and of



William Sheane, sales manager of Zapon Division of the Atlas Powder Company, is shown as he presented a talk at the November meeting of the NEW HAVEN BRANCH, AMERICAN ELECTROPLATERS' SOCIETY. Actively concerned with his company's preparations to meet Government specifications, Mr. Sheane condensed and simplified the considerable fund of information that has been amassed and presented a very clear and concise picture.

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**For Continuous Heat Service up to 150 Pounds Steam Pressure**

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**FACTORY, LAPORTE, INDIANA**

(Left to right) M. Griep, F. C. Rice, H. C. Lawrence, president; A. Pesci, J. A. Hager, F. G. Lynch, and R. H. Brill, recipients of service awards.

**FRED G. LYNCH,** 20 years; and **ROBERT H. BRILL,** 5 years.

---

the plating industry in general. He is a graduate of the Industrial Chemical Engineering School of Pratt Institute, and later received a degree of Bachelor of Science in chemical engineering from Polytechnic Institute, Brooklyn.

After varied experiences in chemical and engineering processes, he joined the U. S. Research Corporation in 1932. Mr. Taormina collaborated with Dr. C. B. F. Young in developing several new chromium plating and anodizing processes. In 1933 and 1934, he was active in association work among electroplating job shops and inducted his group into the Masters' Electro-Plating Association.

In 1937, Mr. Taormina organized Platers Technical Service, Inc., and in 1947 organized a similar laboratory in Chicago.

## HONORS

**JOSEPH A. HAGER,** vice president of the Grand Rapids Varnish Corporation, was presented with a Patek Phillippe gold watch and band in recognition of his 25th anniversary with the company. The occasion was the close of the corporation's 36th annual sales convention September 27 in Grand Rapids, Michigan.

Howard C. Lawrence, president, also presented genuine leather covered lithographed service awards to **MORRIE GRIEP,** 15 years' service; **FRANK C. RICE,** 5 years; **AL PESCI,** 20 years;

The **AMERICAN SOCIETY FOR TESTING MATERIALS** has announced the establishment of an annual H. W. Gillett Memorial Lecture. The purpose of this lecture, which is being sponsored in cooperation with **BATTELLE MEMORIAL INSTITUTE,** is to commemorate Horace W. Gillett, who was one of America's leading technologists, the first director of Battelle in Columbus, Ohio, and an active worker for many years in ASTM.

The memorial lecture will be delivered annually at a meeting of the Society, the first to be given at ASTM's 50th Anniversary Meeting in New York City during the week of June 23, 1952. The lecturer will cover a subject pertaining to the development, testing, evaluation, and application of metals.

Dr. Gillett, in his accomplishments as scientist, engineer, metallurgist, scholar, and writer, in his work as director of Battelle Memorial Institute, in his service to the American Society for Testing Materials, and by his qualities as a man, achieved a place of high honor and distinction among his fellow engineers and in the metallurgical industries.

## MEETINGS

The Annual Banquet and Educational Session of the **CHICAGO BRANCH** of the **A.E.S.** will be held January 26 at the Conrad Hilton Hotel (formerly The Stevens).

Speakers for the program will be R. M. MacIntosh of the Tin Research Institute,

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**For Metal Finishing**

**HOUGHTO-BLACK 15** was developed expressly for low and medium carbon steels (meets U. S. Spec. 57-0-2C, Class A, for Oxide Black Coatings).

**HOUGHTO-BLACK 16** was devised for blackening certain types of stainless steels, cast and malleable iron, and carburized parts.

*Offers extra salability for your products along with these*

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*Ready to give you on-the-job service . . .*

"Speculum Plating"; Dr. Chester, Promat Division of Poor & Company, "White Alloy Plating"; and D. R. Meserve, United Chromium, Incorporated, "Organic Finishes of Plated Surfaces."

## NECROLOGY

**THEODORE P. WALKER,** former president and chairman of the board of Commercial Solvents Corporation, succumbed to a heart attack in New York City on November 28.

A graduate of Drury College, Mr. Walker joined Commercial Solvents in 1922. In 1938 he was elected president, and in 1947 was made chairman of the board. He retired as chairman in December 1950, but remained active as a director of the Corporation.

# meetings

## OF INTEREST TO FINISHERS

**Jan. 14-17. Plant Maintenance Show,** Convention Hall, Philadelphia, Pennsylvania.

**Jan. 26. Annual Banquet and Educational Session, Chicago Branch, A.E.S.,** Conrad Hilton Hotel, Chicago, Illinois.

**Feb. 16. Annual Educational Session and Banquet, New York Branch, A.E.S.,** Statler Hotel, New York, New York.

**Mar. 3-7 Spring Meeting, American Society of Testing Materials,** Hotel Statler, Cleveland, Ohio.

**Mar. 10-14. Annual National Conference and Exhibition, National Association of Corrosion Engineers,** Galveston, Texas.

**Mar. 15. Annual Educational Session and Banquet, Dayton Branch, A.E.S.,** Biltmore Hotel, Dayton, Ohio.

**Apr. 3-5. Pacific Coast Production Clubs' Symposium and Paint Industries' Raw Material and Equipment Exhibit,** Biltmore Hotel, Los Angeles, California.

**Apr. 19. Annual Banquet and Educational Meeting, Boston Branch, A.E.S.,** Hotel Statler, Boston, Massachusetts.

**Apr. 28-30 Spring Meeting, American Oil Chemists Society,** Shamrock Hotel, Houston, Texas.

**Apr. 27-May 1. 54th Annual Meeting, The American Ceramic Society,** William Penn Hotel, Pittsburgh, Pennsylvania.

**May 4-8. 50th Anniversary Meeting, The Electrochemical Society,** Benjamin Franklin Hotel, Philadelphia, Pennsylvania.

**June 16-20. 3rd Industrial Finishing Exposition and 39th Annual Convention, American Electroplaters' Society,** International Amphitheatre, Chicago, Illinois.

**June 23-27. 50th Anniversary, American Society for Testing Materials,** Hotels Statler and New Yorker, New York, New York.


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*PEELABLE* SPRAY-BOOTH COATING

**THE FIRE-SAFE—LABOR-SAVING METHOD THAT ELIMINATES HEAVY OVER-TIME FOR SCRAPE DOWNS**

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# Finishes

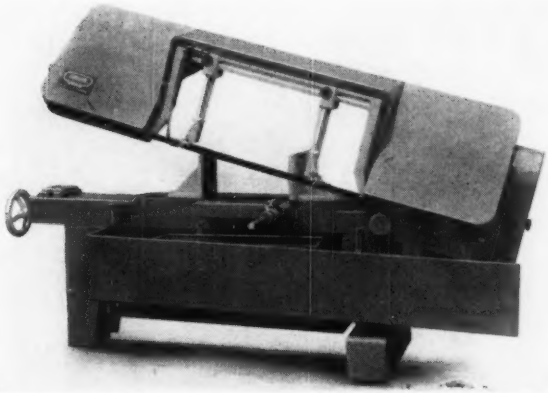
**This gas panel wall furnace, easily installed in almost any kind of wall construction, has a capacity of 25,000 Btu. The outer jacket is finished with a Hammertone rust colored baked enamel, and the combustion chamber is coated with a high temperature enamel.**

*(Photo courtesy Temco, Inc., Nashville, Tenn.)*

**The covered box, called "Raindrops," is made of copper and achieves colors ranging from lapis into baby blue by the use of paillon. The copper base receives a coat of transparent enamel upon which a silver foil, Non-Adhesive No. 4, is applied. The ware is then fired to make the foil adhere. An enameling process with transparent colors, approximating that used for pure silver, is the final step in achieving this strikingly beautiful finish.**

*(Photo courtesy The Cleveland Museum of Art, Cleveland 6, Ohio)*

# *that aid in appearance and utility*



**The heavy-duty Kalamazoo 1200 bandsaw is color conditioned for better vision, reduced work fatigue, and increased efficiency. The frame cover is degreased, given a primer coat, and then painted with a quick-drying lacquer. Frame, bed, and legs are ground and finished by painting. Body of the machine is gray-green, the work area is beige, and the control knobs vermillion.**

*(Photo courtesy Kalamazoo Tank and Silo Co., Kalamazoo, Mich.)*

**The attractive laundry hamper, styled and finished to fit any home, is made of heavy gauge aluminum, finished with a baked-on enamel, and made by Detecto Sales, Inc.**

*(Photo courtesy Bakelite Co., New York 17, N. Y.)*

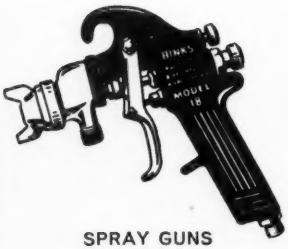
# What this COMPLETE LINE

# OF SPRAY PAINTING EQUIPMENT

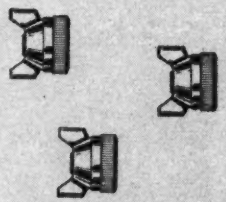
## *means to you in times like these*

**Binks**

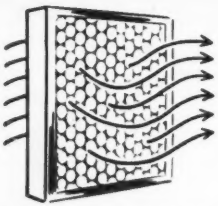
*EVERYTHING FOR SPRAY PAINTING*



SPRAY GUNS
36 models



GUN NOZZLES
1050 combinations



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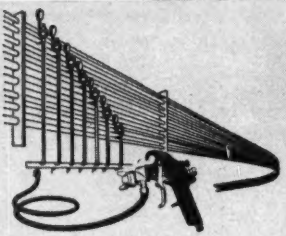
fresh, filtered and heated air



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for identical finishes

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9 models of pumps available

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The standardization of Binks equipment gives you better protection against production delays and maintenance difficulties. Standard pipe threads are used on all Binks equipment.

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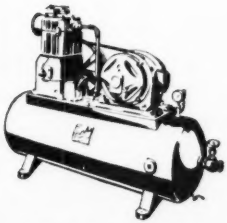

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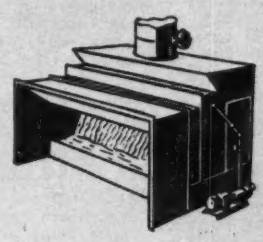

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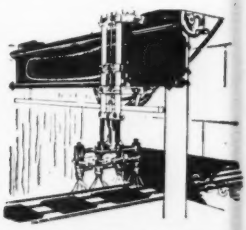
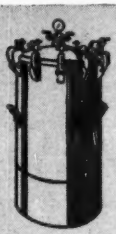
over 510 sizes and styles



**AUTOMATIC EQUIPMENT**
for lower production costs



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2 to 60 gal. capacities

**OIL AND WATER EXTRACTORS**
7 models to supply clean, dry air

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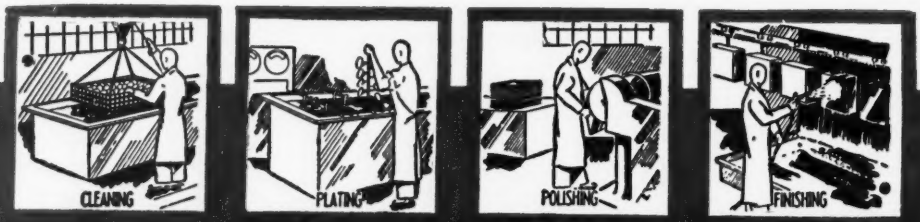
12 types of hose, full line of accessories




# New • EQUIPMENT • MATERIALS • PROCESSES

## "Bantam" Tumbler

Andrew Technical Service, 3805 N. Clark St., Chicago 13, Ill., has announced a portable motor-driven tumbler companion to the company's original 1½-gallon Tumbler-Jar.

The "Bantam" Tumbler comprises a 1-quart glass jar mounted in a quick-damping cage rotated by a gear-head universal motor with rheostat speed control from 20 to 110 r.p.m. Operation is smooth and uniform at all speeds, it is stated.

End-over-end action of the jar subjects the contents to a vigorous displacement for efficient agitation and mixing. Other advantages cited are: compactness, portability, simplicity in use, visibility of contents during treatment, rapid clamping for removal, replacement, or cleaning of jars. When rotation is stopped, the jar can be brought to an upright position by a few simple turns of a control knob.

Mechanical design features include a horseshoe support base of cast iron with heavy steel truss columns, and bronze "Oilite" bearings to carry the rotating jar cage. All parts are precision-machined and fitted, and all support components other than the horseshoe base are cadmium plated for corrosion resistance.

Jars are the "Ball" type, exceptionally strong and durable, with glass cover clamped tight against a gasket of rubber, Tygon, or Neoprene.

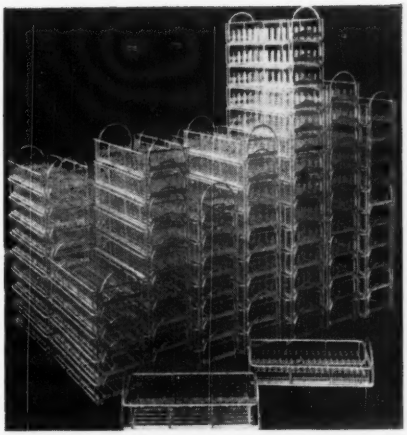
For admitting different sizes of glass jars or test cylinders, the cage is adjustable, and special cage designs can be built to customer's specification.

"Bantam" Tumbler

## Eezy-Stak Wire Basket

An improvement in the means of carrying precision parts through all phases of manufacturing, including plating, drying, washing, and machining, has been developed by Wire and Iron Products, Inc., 1725 Sixteenth St., Detroit 16, Michigan.

The carrier is known as the Eezy-Stak Wire Basket and consists of a metal frame and custom-made inserts that will handle any shape or material. It is especially designed to protect highly-machined finished parts, decal and plated



Eezy-Stak Wire Baskets

parts against abrasion. Eezy-Stak baskets are made of ⅛, ¼, and $\frac{5}{16}$-inch steel wire, ¼, ½, and ¾-inch flat expanded metal, or wire mesh or perforated metal. All types are cadmium plated, lightweight, easy to handle, store and stack, and stated to be extremely durable and long lasting. For especially fragile parts, Eezy-Stak Baskets are available with a rubber or plastic coating.

The manufacturer states that Eezy-Stak Baskets will speed and facilitate inter-factory transportation of parts, decrease the number of rejects, and require virtually no maintenance.

## Corrosion-Resistant Lacquer

A water-white synthetic lacquer that provides non-ferrous metal objects, ranging from hardware fixtures to lipstick cases, with lasting protection against corrosion, has been developed by the United Lacquer Manufacturing Corp., 1001 W. Elizabeth Ave., Linden 8, New Jersey.

The clear lacquer, BO 562, provides unusual hardness, and offers high resistance to tarnishing caused by body acids, perspiration, alkalis, and to corrosive elements in the atmosphere, it is claimed. It may be applied to brass, bronze, aluminum, platinum, copper, and to other non-ferrous metals. It is applied in a hair-thin coating, which preserves an original plated metal effect.

The manufacturer states that BO 562 may be applied by brush, dip, or spray methods. It dries to dust free within a few moments and may be handled within approximately 10 minutes. It is available in gloss, semi-gloss and flats.

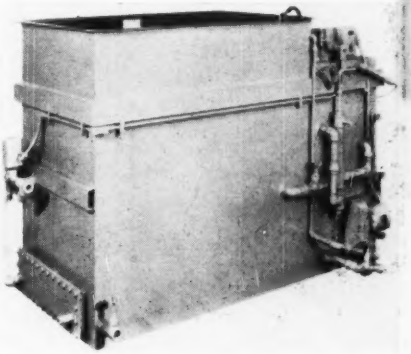
## Improved Solvent-Vapor Degreaser

A completely redesigned and improved model of a Detrex hand-operated, solvent-vapor degreaser has been announced by the Detrex Corp., Detroit 32, Michigan.

The production cleaning machines included in this series, identified as VS-800, make use of non-flammable chlorinated hydrocarbon solvents, either trichlorethylene or perchlorethylene for the complete and high speed removal of oil and grease from all kinds of metal products. The usual cycle of operation is vapor cleaning, then flooding clean solvent over the work with a hand-held spray lance, followed by the usual pure vapor cleaning phase which is characteristic of solvent-vapor degreasing.

A minimum of floor space, lower working height, and an efficient solvent condenser are some of the improvements featured. As the clean-solvent storage tank is built integral with the main machine body, this design has made it possible for the inside work space to be cleared of all projections, including the solvent-collecting trough, condensing coils, and vapor level control bulb, thus

Detrex Improved Solvent-Vapor Degreaser



providing unobstructed entrance for work being cleaned. Easy operation from either side of the machine is also made possible because of the relocation of the solvent storage space.

According to Detrex, further refinements include: simplified piping and water separator arrangement, large access door for easy cleaning of the solvent storage section, and a redesigned condenser coil that provides a greater volume of distillate for slushing. A standard heating-door opening is provided to accommodate the interchange of heating means, consisting of steam coils, gas burners, or electric elements.

## Strapping and Masking Tapes

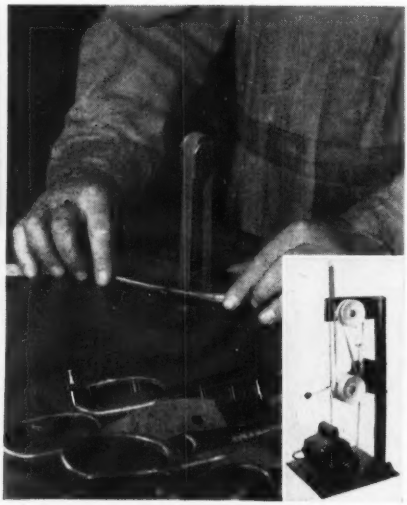
Behr-Manning Corp., Troy, N. Y., has announced the addition of two items to its line of "Behr-Cat" Brand Pressure Sensitive Tapes. Behr-Cat Brand No. 211 Strapping Tape is a glass filament reinforced tape specifically designed for heavy duty service in the fields of stapping, packaging, banding, and carton sealing. This tape, it is stated, has extremely high tensile strength and resistance to handling wear, and its power of adhesion to both porous and smooth surfaces make it excellent for use in wrapping together parts for shipment.

"Behr-Cat" Brand No. 211 Strapping Tape

Behr-Cat Brand No. 113 Masking Tape has been developed especially for the difficult operation of masking off areas on anodized aluminum and magnesium as well as castings of these materials and their alloys, particularly where such parts are to be subjected to high temperatures.

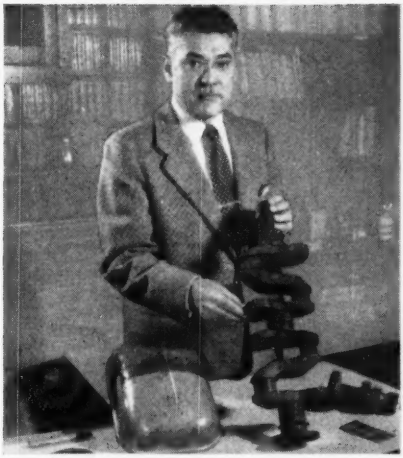
## Alkaline Derusting Process

Announcement of the development of an alkaline derusting process for steel,



## Tongue Sander

The development of a coated abrasive belt sanding unit, especially designed for inside diameter sanding, grinding, and polishing work, has been announced by Behr-Manning Corp., Troy, N. Y. Adopted to either free-running or platen-backed coated abrasive belt operations, the unit has proved successful on such items as bomb straps, horn rings, gas tank necks, tin snips, and heavy shear rings. Known as the Tongue Sander, the unit is not manufactured or sold by the Behr-Manning Corporation but can be easily assembled using standard available parts.



Dr. Walter R. Meyer, inventor of the process for derusting steel, is shown with typical parts that have been derusted.

cast iron, malleable iron, and other iron alloys has been made by Enthone, Inc., Dept. PF, 442 Elm St., New Haven, Conn. The process is stated to be unique in that no acid is required in the procedure, with the attendant advantages of elimination of subsequent rusting, no attack on the base metal, and speed of operation.

Operation of the bath is simple. Parts heavily contaminated with grease should be first degreased. However, light oil is readily removed in the bath. The parts are then immersed in the derusting solution where they are made the cathode for periods of time varying from a few seconds to several minutes, depending upon current density and condition of the surface. A wide range of current density can be employed from five to several hundred amperes per square foot. Speed of derusting is dependent upon the current density used. The bath is controlled by titration. After derusting, the object is clean and bright. Longer treatment does not result in any attack upon the metal being pickled. Therefore, close watching of the pickling process is not required, it is stated.

One of the advantages claimed for the process is that due to the fact that it is alkaline, there is no tendency to cause surrounding equipment to be corroded. Also, subsequent rusting of the part that is derusted is not accelerated.

## Turco "Aviation"

A non-foaming, non-corrosive, non-etching aluminum hot tank cleaner, known as "Aviation," that rinses quickly and completely with no tendency to bake on or leave a powdery residue has been added to its line of products by Turco Products, Inc., Terminal Annex 2649, Los Angeles 54, California.

Advantage of the benefits of agitation can now be taken with non-foaming Turco Aviation. Agitation of aluminum cleaners speeds production by removing the soil-saturated solution from the vicinity of the soiled metal, and exercises a vigorous mechanical scrubbing effect which aids in the removal of loosened soil. The cleaner may be used advantageously with any means of obtaining vigorous circulation of the cleaning solution, it is claimed. Also, aluminum cleaned with Aviation is completely free of powdered residue and is ready for further processing immediately.

Aviation, which meets the corrosion requirements of MIL-C-5543, quickly removes all types of foreign matter. Especially designed for use on reactive metals such as aluminum, magnesium, and their alloys, it may also be used on many other

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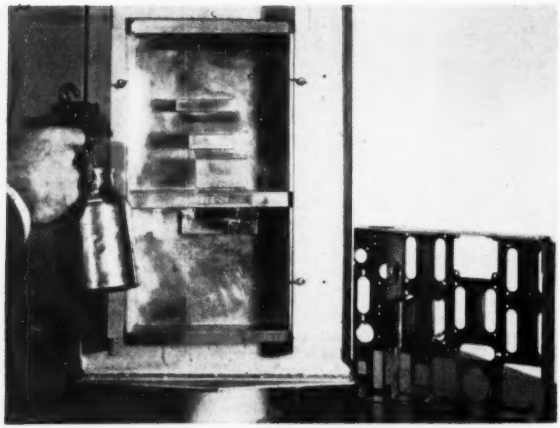

Precision stencil used to code electronic chassis

metals. After dissolving quickly in hot water into a clear stable solution that will not sludge or salt out, it cleans thoroughly and rapidly during a long tank life. It will not etch or darken highly polished aluminum, the company states.

## Precision Stencils

Increased code marking production of any complicated electronic device is now easily possible with Precision Stencils made by the Jas. H. Matthews & Co., 3918 Forbes Street, Pittsburgh 13, Pennsylvania. In a few seconds, a complete electronic chassis can be coded for its component parts by paint spraying, and each non-corrosive stencil guarantees accuracy of code marking, it is stated.

Matthews Precision Stencils are not stock items but are made by specification to fit snugly over the part to be marked, regardless of its shape or size. Each code or symbol is precisely relieved from the contour-formed stencil by expert craftsmen, assuring accurate, perfectly legible reproduction. Stencil holders make it possible to spray both sides of an electronic chassis in a single operation, and eliminate the necessity of handling a "wet" stencil.

## Heavy-Duty Metal Primer

A rust-inhibitive primer that is completely effective under practical plant conditions and can be used with either conventional paint or active-solvent top coats has been announced by the Prufcoat Laboratories, Inc., 50 E. 42nd St., New York 17, New York.

Designated as Prufcoat Primer P-50, the company lists the following features: it is composed of a heavy-bodied oil-modified percentage of inhibitive pigments, principally zinc chromate. The Primer P-50 vehicle is such that the pigments are completely free to perform their rust-inhibitive function; thus, under-film corrosion is effectively prevented.

Being a heavy-bodied material, it deposits a relatively heavy primer film which tends to level out rough surfaces and provides the needed extra protection at sharp edges, rivets, projections, and other vulnerable points.

Prufcoat Primer P-50 combines the many features of a good conventional primer with rapid drying and curing. It may be used for all applications where conventional metal primers are ordinarily used. No extra steps or special operations are needed.

The primer is for use on either ferrous or non-ferrous metals. Claimed to be highly effective from an inhibitive standpoint on iron, steel, aluminum, and magnesium, it also exhibits good adhesion to brass, copper, lead, and Monel metal.


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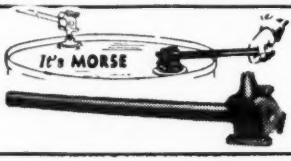


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Operator performing "touch up" on automobile using Powr-Pak spray lacquer and dispenser

## Spray Lacquer and Dispenser

Powr-Pak, Inc., 1488 Barnum Ave., Bridgeport, Conn., has developed a spray lacquer that will restore the "factory finish" to damaged surfaces and always be ready for instant reuse. Special equipment has been built by Powr-Pak to handle the packaging of small lots of this spray lacquer in a great variety of colors and formulations.

The spray lacquer dispenser requires no experienced operators to apply, no thinning, mixing, or brush cleaning. Those organizations requiring special colors can have the formulation developed by the company's laboratories, applied to the account's product with an exact color match, and submitted for approval to the chemists of the manufacturer.

## Addition Agent Pump for Plating Baths

A practical and useful Addition Agent Pump that provides small but constant rate of flow of any addition agent to any reasonably large plating tank has been made available by R. O. Hull & Co., Inc., 1306 Parsons Court, Rocky River 16, Ohio.

The Addition Agent or Sigmamotor Proportioning Pump is self-priming. One pump operates one to four individual lines from the supply tanks to the plating tanks. Any liquid that does not affect rubber, Neoprene, or Tygon tubing (liquid does not contact anything but the tubing) can be pumped at any desired rate of flow from 12 ounces to 27 gallons per hour, it is claimed. Addition agents may be diluted as necessary for proper flow rate. While highly useful for pumping bright zinc and bright nickel addition agents, and so on, the pump can be handy when used to transfer acids or any other corrosive liquids.

## Rohco Comet Rectifier

Added convenience features as well as simplicity and dependability of the Rohco Comet Rectifier are announced by R. O. Hull & Co., Inc., 1305 Parsons Court, Rocky River 16, Ohio. Designed for Hull Cell Control or other small-scale plating operations, the Comet is a modern control unit for the plating of chromium, bright nickel, zinc, cadmium, brass, and copper.

Specifications of the rectifier are: input, 110 volts, 60 cycles a.c., single phase; output, 0-6 amperes at 0-18 volts—0-30 amperes at 0-15 volts; minimum ripple—heavy duty rectifiers for continuous operation; ammeter, dual range, 0-6; 0-30 amperes; voltmeter, single range, 0-20

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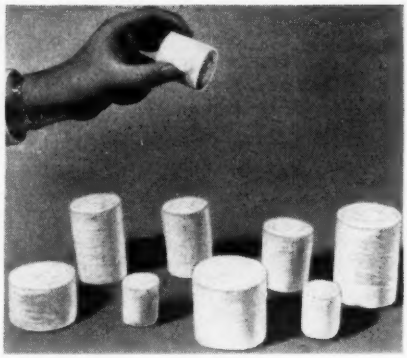
volts; stepless voltage control, 0-full load; timer, interval, 0-5 minutes with manual stop; may be switched in or out of circuit; dual convenience outlets for 110-volt accessories.

## Polishing Units

Rollies, which combine applicator and abrasive or other required compound into one convenient unit, are the product of the Embree Manufacturing Co., 10 W. Mravlag Pl., Elizabeth 4, N. J. Available in a wide variety of sizes for either hand or mechanical use, these polishing units are constructed of cotton or other fibrous material, are impregnated throughout with any one of a wide variety of polishing, buffing, oiling, or other compounds, and then machine rolled in cellulose tissue with both ends exposed for use.

Originally created for use in polishing metals as well as porcelain surfaces, Rollies are now being used in the final polishing and cleaning operations on cast metal hardware parts. Other specific applications include their use in the manufacture of metal products and metal machinery parts, polishing operations in the manufacture of jewelry, and the protective oiling of metal surfaces.



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Supplied in brass, steel or nickel silver wire in sizes .0025 - .006 or bristle, Nylon or fibre. Special sizes and shapes to order.

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## Stainless Steel Coating

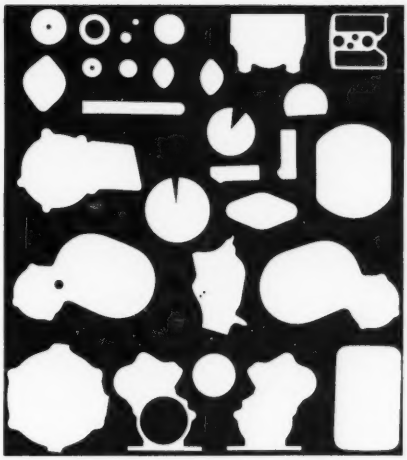
Product of the Steelcote Manufacturing Co., St. Louis, Mo., Steelcote Stainless Steel Coating for all metal surfaces provides the appearance of unpolished stainless steel.

Applicable by brush or spray gun, the coating dries to handle in 30 to 60 minutes, and for regular use in 3 to 4 hours. It protects against rust, corrosion, and other types of deterioration caused by salt air and water, industrial atmospheres, oils, greases, most strong acids, heat, cold, and sunlight, the manufacturer states. The film is non-flammable, odorless, and takes fungus treatments.

## Improved Paper Spray Masks

The By-Buk Co., Dept. 43, 4314 W. Pico Blvd., Los Angeles 19, California, has developed an improved pressure-sensitive-type paper mask, which enables fast, accurate masking for production line spray or brush painting and sandblasting. As much as 90 per cent reduction in manhours plus higher production are claimed through the use of this custom die-cut mask. Over-masking down the sides or over the surfaces is eliminated since every mask fits the area to be protected.

Special die-cut presses cut the exact specification of size and shape of the



By-Buk Improved Paper Spray Masks

area to be masked. A special grade of pressure-sensitive adhesive is impregnated on the back of the tough paint and lacquer-resistant masking paper. The manufacturer claims it has sufficient adhesion to hold the edges down tight but not enough to prevent easy peeling of the mask without marring or leaving a residue on the finished surface, and does not dry out or lose its sticking qualities.

When several different mask shapes or sizes are required for a single job, the manufacturer will supply the complete set, die-cut from one sheet, ready for quick handling by the operators.

## Improved Porcelain Enameling Process

A process for finishing kitchen ranges, refrigerators, and other porcelain enameled products has been developed jointly by Republic Steel Corporation and Ferro Corporation of Cleveland, Ohio. While it may be some time before it can be successfully adapted to all the various finishing requirements of the industry, its wide use is predicted in the next few years with substantial savings in cost. The process will greatly broaden the field of use of porcelain enamels, it is predicted.

The process permits the application of a single coat of titania-opacified enamel directly to enameling iron and many cold-rolled steels, eliminating the ground coat and/or the necessity for using premium steels.

This process involves a unique method of treating the steel. The usual steps of cleaning and rinsing the steel in preparation for pickling are followed. A special pickling process, which produces a very sharp etch removes more iron than sulfuric acid pickling, and gives a rough surface to the metal. A sandblasted surface is also satisfactory, instead of the pickling step.

Crux of the process lies in the treatment of the metal. A nickel deposition process is used which differs from the usual nickel dip in that the deposition action is non-galvanic. In ordinary nickel dipping, some iron goes into solution when the nickel is deposited on the iron. With this process, deposition of the nickel is brought about by chemical reduction, so no iron goes into solution, thus providing the rough surface needed to give the steel the required adherence quality. By depositing the nickel in this way, the steel is given a more continuous nickel coating, it is stated.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**TAILOR-MADE BUFFING & POLISHING COMPOUNDS**

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**for setting up wheels, belts, and rolls**

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The final step is to rinse the steel in cold water. In conventional pickling processes, the slight acidity of the nickel must be neutralized to prevent rust, but since the nickel is applied more continuously with the process, rust is not a problem, and the only rinsing action necessary is to remove the metal treatment salts.

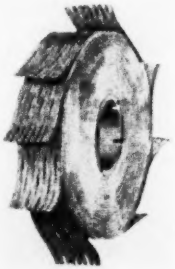
Conventional porcelain enameling techniques are used in applying the enamel to the steel.

The one-coat finish, only half as thick as ordinary porcelain-enamel coatings, has many advantages, it was reported. The thinner coating offers increased resistance to impact, heat, thermal shock, and torsion. Products enameled by the process can be bent, drilled, sheared, and sawed with clean edges. Surface, reflectance, and color qualities are said to be equal to those of conventional porcelain enamel finishes.

## "Scored Abrasives" for Sand-O-Flex Contour Sanders

Merit Products, Inc., 4023 Irving Pl., Culver City, California, is supplying "scored" abrasive refill cartridges for use in its line of Sand-O-Flex brush-backed contour sanders.

To add greater flexibility to the triple-flexed action, the abrasive cloth has been processed on machines built specifically for this purpose.



Scored Abrasive Cloth

Sand-O-Flex refill cartridges are composed of several strips of abrasive wound around a central core and are loaded in less than a minute. The strips unwind and are backed by brushes which "cushion" the abrasive, forcing it over intricate shapes. Cartridges are available in garnet and aluminum oxide cloth in a wide range of grits.

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DETROIT
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## Odorless Dampcoat Enamel

The Wilbur & Williams Co., 130 Lincoln St., Brighton 35, Mass., has announced its odorless industrial paints which not only have no odor during the painting operation but have paint qualities such as resistance to steam cleaning, dampness, and greases.

Available in gloss, eggshell, or flat finish, Odorless Dampcoat Enamel is fast drying, non-yellowing, and paints over damp or dry, painted or unpainted metal.

## Solaramic Process

A process that can save the nation tons of scarce strategic materials by coating metals with ceramics has been announced by Solar Aircraft Company.

The process consists of types of ceramic coatings developed by Solar that are extremely thin and strong, and able to withstand intense heat and corrosive action. Solar has also perfected improved methods of spraying metal parts with the ceramic mix.

Parts to be coated must be carefully cleaned by acid etching, sandblasting, or in other ways. Then they are coated by dipping or spraying. After the coated

There is only *one* PENTRATE . . . the oldest name in black oxide finishing. Since 1923, it has stood as the leader in uniformity, dependability and quality. Discerning metal finishers have used over *twelve million* pounds. This label is your assurance of reliability and continuous research for an even better product — insist on it!

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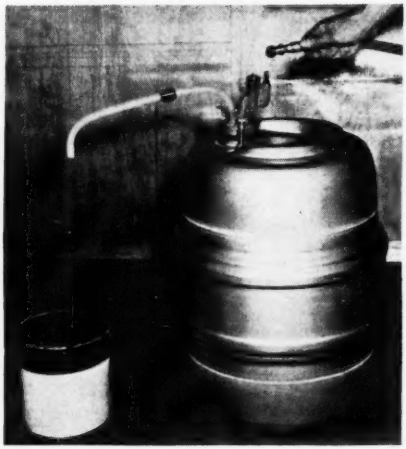
parts are dried in an oven, they are fired in a furnace to redevelop the coating. In most cases, the Solaramic coating can be used with a single coating, although a double coating is employed to achieve special results.

## GS No. 17 Pump

Safe and convenient transfer of acids and other liquids from stainless steel containers is now possible with the GS No. 17 pump, according to the manufacturer, General Scientific Equipment Co., 2700 W. Huntingdon St., Philadelphia 32, Pa. Liquids flow smoothly and stop instantly, and come in contact only with the corrosion-resistant tube.

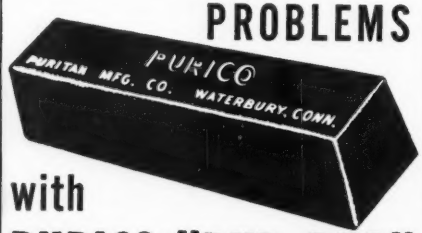
The GS No. 17 Pump is fitted with a safety valve for air line pressure and a hold-down clamp to secure the pump into the container, together with a 25-foot $\frac{3}{8}$-inch air hose with male or female coupling and chuck attached.

Lead tubes are suitable for sulfuric, hydrochloric, hydrofluoric acids, and many others. Saran plastic tubes are recommended where the pump is to be used in nitric, muriatic, citric, phosphoric, acetic, bleaches, peroxide, and others.



GS No. 17 Pump


PUT AN END TO YOUR BURRING PROBLEMS

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## Process for Coloring Aluminum

A chemical process called Alumox 44, that in one operation permits the protection and coloring of aluminum in such colors as yellow, blue, green, gold, brass, and many others, has been announced by Enthone, Inc., Dept. PF, 442 Elm St., New Haven, Connecticut.

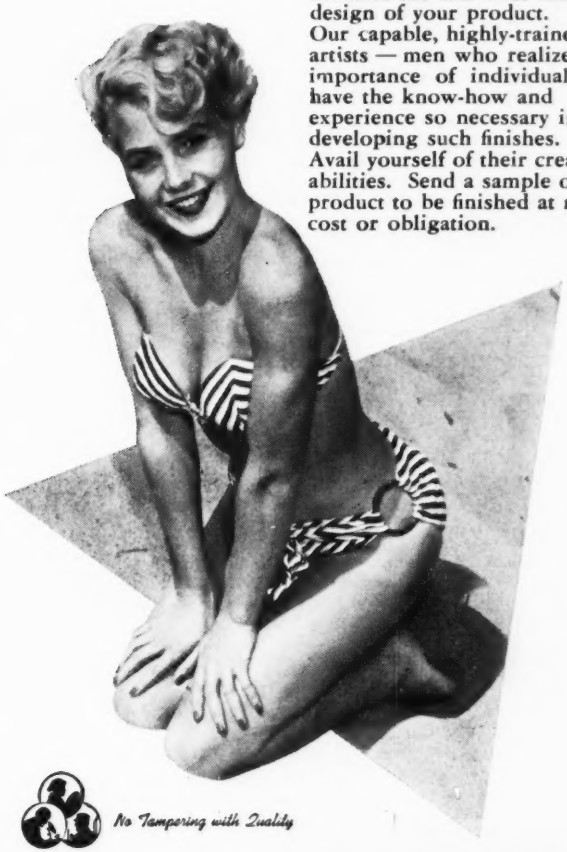
The procedure for coloring consists of cleaning the aluminum part and then immersing it in a solution of Alumox 44 salts. Dyes can be added to the processing solution so that coating and dyeing occur simultaneously. It is claimed that with this process aluminum objects can be dyed shades of brass and gold to resemble solid metals.

Alumox 44 is equally effective on bulk work or large objects, it is stated, and clear coatings can be produced on aluminum to reduce finger marking and protect the aluminum against weathering. The coatings are relatively non-conductive and have a thickness of approximately 0.0001 inch.

The process is not meant to be a substitute for electroanodizing but was designed as a means of rapidly producing adherent beautiful colors on aluminum. In most cases, the finish is covered with clear lacquer. Almost all aluminum al-

# *Attractive*

Distinctive finishes — skillfully prepared in our Creative Studio— have attracting qualities, too! They are eye-catching, sales-motivating coatings which subtly enhance the fine lines and design of your product. Our capable, highly-trained artists — men who realize the importance of individuality — have the know-how and experience so necessary in developing such finishes. Avail yourself of their creative abilities. Send a sample of your product to be finished at no cost or obligation.



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**GORDON BARTELS CO.**
***Roller Coating Specialists***

loys can be processed successfully, including the wrought and the cast alloys.

The "Alumox 44" salts are available as a powdered material which is added to water in a concentration of 1 lb./gal. The bath operates in the temperature range from 190 to 210 deg. F. Coloring is accomplished in from 15 seconds to 2 minutes.

## PRODUCT LITERATURE

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

**Resistoflex Data Sheets.** A number of data sheets have been released by the Resistoflex Corp., Belleville 9, N. J., which deal with synthetic molded and extrusion parts, hoses, and hose connections. Some of the data presented in these sheets are resistance to common industrial chemicals, specifications and sizes of hose assemblies, and fittings for fabricated hose assemblies.

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**Electrical Equipment.** A 12-page catalog is available from the Udylite Corp., 1653 E. Grand Blvd., Detroit 11, Mich., which lists and discusses electrical equipment such as rectoplaters, selenium rectifiers, regulators, rheostats, switches, control panels, and motor generator sets offered by the company.


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Well illustrated, the catalog discusses the characteristics of the various pieces of equipment and includes tables listing their specifications. Wiring diagrams and temperature rise curves are also included where applicable.

---

**"Thickness Measurement"** is the title of a reprint by Maynard R. Euverard, available from the Henry A. Gardner Laboratory, Inc., 4723 Elm St., Bethesda 14, Maryland.

The article deals with the measurement of very fine thicknesses by two gages developed by the author: Interchemical Wet Film Thickness Gage and the Gardner Gage for measuring dry thicknesses. Both instruments are described in great detail as to how they can be used, their accuracy, their ranges, and their importance to consumers.

---

**Paint-Anchoring Phosphate Treatment for Metals.** An eight-page booklet describing Anchorite 100, a paint-anchoring corrosion-resistant phosphate treatment for metals, has been published by Octagon Process, Inc., 18 Bank St., Staten Island 1, N. Y. Attractively printed in two colors, the booklet describes in detail the common causes of paint failure and how they can be prevented. It then goes into methods of application—immersion and spraying—of the Anchorite 100 treatment.

A separate discussion of typical products to which the process can be applied is well illustrated, and includes a number of defense items. The booklet points out that Anchorite 100 is one of the pre-painting treatments that meets the specifications for Class C (Type II) finish in U. S. Army Specification No. 57-02C, as well as JAN-C-490, Grade 1.

---

**"Nukemite Protective Coatings and Tank Linings"** is the title of a catalog issued by Nukem Products Corp., 110-120 Colgate Ave., Buffalo 20, N. Y. Three different acid and alkali-proof resin coatings, Nukemite 24, 35, and 40, are discussed in considerable detail in this catalog. Chemicals to which the linings are resistant, their diversified uses, special features and properties, and partial lists of industries using these coatings are listed.

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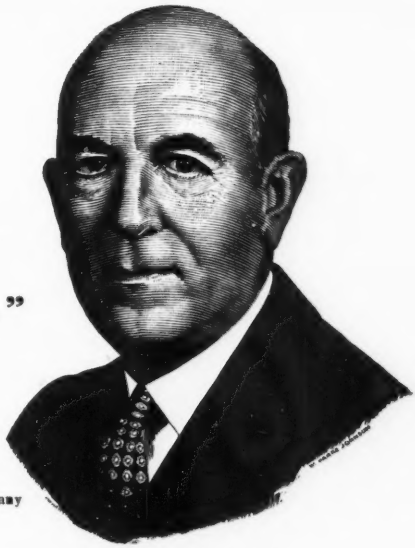

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PRODUCTS FINISHING

**For more complete information on products and processes use READER SERVICE CARDS inside covers.**

**"Monoglycerides Finding Wider Uses in Industry"** is the title of a reprint of an article that is available from the Glyco Products Co., Inc., 26 Court St., Brooklyn 2, N. Y. Described are monoglycerides of the fatty acids, such as stearic, oleic, lauric, ricinoleic, and so on, and methods of manufacture are discussed. The varying compositions and physical properties which are possible are outlined and a specifications chart is included.

---

**Engineering Properties and Applications of Ni-Resist,** a 36-page bulletin describing eight types of austenitic nickel alloy cast irons that offer unique combinations of properties, is offered by The International Nickel Co., Inc., Dept. EZ, New York 5, N. Y.

Applications and comparative service data in many industrial fields are presented to prove its utility in withstanding corrosion, heat, wear, and low temperature. High or low controlled expansion, magnetic or non-magnetic properties, and resistance to thermal shock add variety to its usefulness.

A reference booklet, it is well illustrated with photographs, tables of properties and corrosion data on nearly 100 conditions.

---

**MSA ChemKlos,** work clothes made of the new Dynel fabric, which have been introduced by the Mine Safety Appliances Company, are said to resist acids, caustics, wear, moths, mildew, shrinkage, snagging, and tearing. Complete details are included in **Bulletin No. CF-28,** available from Mine Safety Appliances Co., Braddock, Thomas, and Meade Sts., Pittsburgh 8, Pennsylvania.

---

**Special Plating Processes.** The Hanson-Van Winkle-Munning Co., Matawan, N. J., is offering a new and revised condensed description of special H-VW-M Electroplating Processes. Bright, high speed processes are described for the electroplating of cadmium, zinc, copper, nickel, and silver, along with information on improved methods for lead plating. For those interested in any particular process, technical manuals illustrating and describing the various processes in detail form are available.

---

**"Wheels of Industry—Short Cut to Coloring"** is the name of a bulletin issued by Behr-Manning, Troy, New York. This six-page pamphlet lists various types of contact wheels, both buff and rubber. Applications and mountings are illustrated; equations, complete with an example on calculations of peripheral speeds, in S.F.P.M., are given.

---

**Hot Spray System.** Available when requested on company letterhead from the Arco Co., Dept. P, 7301 Bessemer Ave., Cleveland 27, Ohio, is a 20-page booklet describing an integrated system for hot spray application of product-finishing lacquers and enamels. Complete details of the method, material, and equipment are presented.

Viscosity vs. temperature curves, diagrams and pictures of the various units that make up the system are included.

---

**Cone-Loc Drum Sanders.** A bulletin is available from the American Diamond Saw Sales, 120 N. W. Ninth Ave., Portland 9, Ore., which describes a sanding wheel that uses an abrasive belt which is wound around its outside perimeter. The hinge joint of this portable grinding and polishing tool permits opening of one side of the perimeter and web, thus easily facilitating the removal and replacing of coated abrasive strips. Consequently the wheel never requires dressing down.

Operating speeds, standard rubber cushion sizes, and felt cushion sizes are listed in this bulletin.

---

**"Heat Processing . . . with the most advanced techniques and equipment,"** a bulletin issued by Selas Corporation of America, approaches heat processing through five basic questions: what is to be heated, what sections are to be heated, why the material is to be heated, to

what temperatures, and the heating time. The bulletin illustrates the application of high-production heating principles to solid and fluid products ranging in size from mill operations to delicate enameled pieces. The bulletin, **No. S-7.1,** is available upon request to Selas Corporation of America, Philadelphia 34, Pa.

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**Removal of Buffing Compounds from Metals.** Philadelphia Quartz Co., Public Ledger Bldg., Philadelphia 6, Pa., has available reprints of a paper entitled **"Removal of Stearic Acid from Surfaces by Alkaline Detergents,"** in which J. Fred Hazel and William Stericker have indicated that too high a concentration of an alkaline cleaner in removing stearic acid from zinc did not give as good results as an intermediate concentration. It was determined that this was the result of the sodium stearate, which has been formed and had reduced solubility under the resisting highly alkaline conditions. The thin plate thus formed prevented any further cleaning from taking place. The cleaners used in these tests were sodium hydroxide, trisodium phosphate, sodium carbonate, and several types of sodium silicate.

---

**"Your Metal Rearmament Products Can Be Handled and Cleaned Mechanically"** is the title of a booklet available from the Alvey-Ferguson Co., 632 Disney St., Cincinnati 9, Ohio. The most efficient methods of cleaning and handling shells, cartridges, machine gun barrels, rifle parts, gun parts, cartridge cases, and other metal rearmament products are fully described and pictured in the folder.

---

**Abrasive-Belt Machines.** Porter-Cable Machine Co., 1708 N. Salina St., Syracuse 8, N. Y., has prepared an illustrated 28-page catalog which, in addition to containing factual descriptions of its abra-

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sive-belt machines, is also a basic manual on the subject. Comprehensive information is provided on wet belt grinders, dry belt grinders, centerless belt grinders, contour grinding and polishing machines, backstand idlers, and bench and utility grinders, including a basic description of each machine, its operation, and the scope of its uses.

---

**Bright Nickel Plating Process. Bulletin 51,** on the plating process of bright nickel, is available from The Udylite Corp., 1653 E. Grand Blvd., Detroit 11, Mich. The bulletin lists and discusses the advantages of bright nickel and some of the products on which it is used. Its characteristics, such as anode and cathode efficiencies, purity of deposits, are given. Detailed information is included on the plating solution, anodes, agitation, tanks, operating conditions, current density, voltage, and heating.

---

**Triangle Equipment.** A 16-page catalog is available from the Triangle Equipment Co., Inc., 45 River Rd., Nutley, N. J., which depicts and describes overhead conveyors, load toters and boosters, freight-ladders, and infra-red ovens. Various applications of the Tipp Cable-Way Conveyors and infra-red ovens are described and shown.

Graphs show engineering data such as temperature of metal versus time of exposure, per cent moisture removed versus exposure, time, and comparative reflection. Included in the bulletin is a parts list of prefabricated pierced panels and prewired channels.

---

**Abrasive Discs.** A-four-page catalog bulletin, **Form ESA-54,** has been issued by the Simonds Abrasive Co., Philadelphia 37, Pa., which describes the use and application of nut-inserted and bolt-inserted abrasive discs and cylinders for horizontal or vertical spindle disc and surface grinding operations. Included are grain and grade recommendations for common disc grinding operations.

**"How to reduce your maintenance painting costs"** is the title of a manual describing Staize-Clene, the dirt-repelling enamel manufactured by the Enterprise Paint Manufacturing Co., Dept. GPH, 2845 S. Ashland Ave., Chicago 7, Illinois.

This manual indicates that interior surfaces painted with Staize-Clene enamels will stay clean over very long periods of time. Savings of as much as 40 per cent have been noted in maintenance painting expenditures because Staize-Clene surfaces do not get dirty.

---

**Electric Air Heaters.** Portable and built-in electric air heaters used in every industry and business are described in four-page folder **No. F-1530,** available from Edwin L. Wiegand Co., 7552 Thomas Blvd., Pittsburgh 8, Pa. Convection, blower, duct, and radiant types available for immediate shipment are shown together with suitable automatic controls. Application photographs illustrate factory and office uses. The units, which are stated to provide safe, clean, dependable heat for continuous or stand-by needs, are standard stock. Special sizes and ratings can be custom made to suit requirements.

---

**"Bonderite As An Aid in Cold Forming"** is the title of a 12-page technical brochure available from the Parker Rust Proof Co., 2172 E. Milwaukee Ave., Detroit 11, Mich. Photomicrographs of steel, stainless steel, and aluminum show the effect of this process on these metals. Many examples, complete with pictures of installations and steps in the cold forming process, illustrate its use in the industry.

---

**Enthone Check List.** Available from Enthone, Inc., 442 Elm St., New Haven, Conn., is a four-page catalog which covers various finishing processes and materials that have resulted from technical research and practical application. Compounds for such processes as blackening, stripping, cleaning, pickling, plating, and tumble grinding and burnishing are list-

ed. Plating equipment such as racks, rectifiers, and tanks is listed and depicted.

---

**Industrial Wire Cloth.** The Cambridge Wire Cloth Co., Cambridge, Md., has available **Bulletin No. 101** which lists and depicts uses and weaves of industrial wire cloth.

Such weaves as flat wire mesh, double crimped, twilled weave, and many others are clearly illustrated and their uses in such applications as filtration, conveying, and straining are listed.

---

**General Purpose Fans. Bulletin 512** on portable, self-contained units of medium capacities for ventilation and industrial applications is now available from The New York Blower Co., 32nd St. and Shields Ave., Chicago 16, Illinois.

The bulletin depicts and describes the various types of fans. Engineering features, such as mounting and overall dimensions, drives, operating temperatures, speed adjustments are listed. Tables give performance characteristics in c.f.m. at various static pressures and capacities in c.f.m. for various sizes of fans.

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**Corrosion-Resistant Coatings.** A six-page folder on Permolite organic corrosion-resistant coatings, which can be applied by brush, spray, or dip, is available from Permolite, Inc., Hamilton, Ohio. Many typical applications are pointed out, together with pictures of the manufacturer's custom-coating plant. A service whereby test panels or actual parts are coated and returned to the inquirer for test purposes is described.

---

**Bulletin No. 703-AL,** pertaining to the Aja-Lif Cleaning Machines, is available from the Equipment Division of Magnus Chemical Co., Inc., Garwood, N. J. Well illustrated, the bulletin explains how Aja-Lif cleans the work by automatically immersing it in the tank, agitating it with an "up and down" movement, and raising it to the work level at the end of the cycle.

Complete specifications as to dimensions, agitation data, heating data, fuel supply, and solution data are included.


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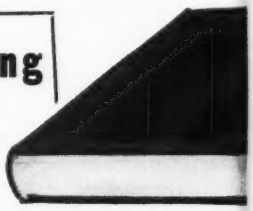

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*(Please send check with order)*

**PRODUCTS FINISHING, 431 Main Street, Cincinnati 2, Ohio**

**"Technical Instruction on S-B Process for Zinc Plating,"** a newly revised bulletin bringing this process up to date, is available from the Hanson-Van Winkle-Munning Co., Matawan, N. J. The process produces zinc deposits satin bright to bright in color, and particularly receptive to conversion coatings such as Lusteron, Cronak, Iridite, and Anozinc.

---

**Penfield Water Conditioning Equipment.** A four-page catalog describes and illustrates mono-bed and four-column demineralizers, softener-dealkalizers, silica-removing demineralizers, water softeners, degasifiers, water filters, and water storage tanks. Capacities of the various units are given, and a table lists performance, in gallons demineralized per cycle, of several of the demineralizers. Copies of the catalog may be obtained from the Penfield Manufacturing Co., Inc., 19 High School Ave., Meriden, Connecticut.

---

**Industrial Tape Uses.** Polyken Industrial Tape has released the **Polyken Standard Industrial Classification Manual** which cites 1500 applications for industrial tape. Those interested in the manual should write to Section P2, Polyken Industrial Tape, Dept. of Bauer & Black, 222 Adams St., Chicago 6, Illinois.

---

**Masking Tape and Stencils** are the subject of a brochure available from Ponoco, 505 Carroll St., Brooklyn 15, N. Y. Simple and multiple masking, stenciling, and sandblasting with custom die-cut masking tape or stencils are illustrated and discussed in this brochure. The company has 22 tape types available for die-cutting to exact customer specifications.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.

**Rapid Identification of Some Metals and Alloys.** A 52-page booklet has been released by the Development and Research Div., The International Nickel Co., Inc., 67 Wall St., New York 5, N. Y., on spot testing of metals and alloys.

Ten charts divide the groups of metals and their alloys into sections for identification. Concentrations of reagents, necessary time, and interpretation of the results are given for all tests that can be made for identification purposes.

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**Enthonite 101,** available from Enthone, Inc., 442 Elm St., New Haven, Conn., is a liquid plastic rack coating. The four-page catalog describes and depicts its uses, applications, and advantages.

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**Bulletin M-100** on several small but important items in electroplating plants, including rubber gloves, Koroseal aprons, carboy pouring spout, acid pumps, earthenware crocks, rubber pails, Tygon paint, H-VW-M oxidizing liquid, acid pitchers, burnishing shot, and burnishing balls, may be obtained from the Hanson-Van Winkle-Munning Co., Matawan, New Jersey.

---

**Metal Preparation and Rustproofing.** Klem Chemicals, Incorporated, 14401 Lanson St., Dearborn, Mich., has released a four-page illustrated pamphlet on its new metal conditioning process, Klem Kote. Used in a three-stage washer system, it provides paint adhesion and salt spray resistance equal to five and six-stage rustproofing systems, and imparts a fine, iridescent, crystalline, tightly-adherent, complex phosphate coating to the metal surface.

---

**Tri-Mur-Lite.** Directions and data sheet on Tri-Mur-Lite, which when added to Stoddard Solvent will produce a degreasing fluid, is discussed in a bulletin available from the Murphy Chemical Corp., 480 Lexington Ave., New York 17, N. Y. The concentrate is a bright, clear, odorless, amber-colored liquid which, when mixed with the Stoddard Solvent in a ratio of one gallon of concentrate to 15 gallons of Solvent, produces a degreasing fluid which may be used for either batch cleaning or production-line cleaning.

The bulletin discusses the non-toxic properties of Tri-Mur-Lite, the necessary equipment for its use, and its functions in pre-dipping operations, pre-dipping with alkali, and machinery cleaning.

---

**"Continuous Grinding,"** a 28-page catalog in which Patterson Ball, Tube, and Rod Mills are detailed, has been published by The Patterson Foundry & Machine Co., East Liverpool, Ohio. Available with a variety of grinding media, these mills operate on the continuous principle, and are adaptable to wet or dry grinding, open or closed circuit grinding, grinding as fine as 10 microns or as coarse as 4 mesh. Included in **Catalog No. 514** are over 50 illustrations; technical descriptions; and charts which show size, weight, linings, ball charge, speed, power requirements, and motor sizes for the various Patterson Mills. Also, special consideration is given to accessory equipment such as feeders and mill drives. In addition to descriptions of the mills themselves, complete Patterson Continuous Grinding Systems are discussed.

---

**Synthetic Flexible Products and Parts** are the subject of a bulletin available from Resistoflex Corp., Belleville 9, N. J. The bulletin discusses such topics as where to use Resistoflex lines, the chemical and physical properties obtained, and types of construction. Pictures illustrate how this hose may be used to solve design problems.

---

**"Quality Control in the Making of Plating Rectifiers"** is the title of a reprint available from the Rapid Electric Co., 2881 Middletown Rd., New York 61, N. Y. Well illustrated, the reprint discusses efficiency test, overload tests, voltage regulation test, phase protector tests and other miscellaneous tests.

---

**Nukemite No. 24,** an acid and alkali-resistant resin coating, is discussed in a pamphlet issued by Nukem Products Corp., 110-120 Colgate Ave., Buffalo 20, N. Y. Characteristics of this resin lining, such as coverage and applications, and preparation of surface are discussed. Nine color samples, in which the coating is obtainable, are given in the pamphlet.

**Tantalum Heating Equipment.** Heat exchangers with Tantalum internal tubes and heating coils with Tantalum tubes are discussed and illustrated in a bulletin available from United Chromium, Incorporated, 100 E. 42nd St., New York 17, N. Y. Tantalum is a metal immune to all plating and pickling acids except hydrofluoric and is capable of withstanding thermal shock. Consequently, it can be used in all plating and pickling solutions and may be used for cooling as well as heating purposes.

Drawings and pictures illustrate the "hairpin" and "U-bend" type heating coils and heat exchangers.

---

A four-page catalog, **Enthone Acid Addition Agent,** may be obtained from Enthone, Inc., 442 Elm St., New Haven, Conn. This agent is a liquid mixture of inhibiting, penetrating, and foaming agents stable in acid solutions. Its actions and its several uses are discussed in detail and directions for its use are given.


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**Link-Belt Spray Nozzles.** Up-to-date information on Non-Clogging Spray Nozzles for cleaning all kinds of materials, is given in 4-page illustrated **Folder No. 2386** released by the Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill. Installation pictures show how simply the nozzle can be applied. Tables give dimensions of nozzles for pipes of 1 to 3-inch diameters, and the capacity in gallons per minute through orifices of 5/32 to ½-inch diameter at pressures of 20 to 100 pounds per square inch.

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**Demountable Abrasive Points.** Simonds Abrasive Co., Philadelphia 37, Pa., has released **Form ESA-65-A,** a four-page catalog bulletin, which describes Simonds line of abrasive mounted wheels and mounted points with removable spindles. The abrasive wheel or point simply screws off or on the spindle without removing it from the chuck. The bulletin lists and illustrates standard sizes and shapes in which this feature is available.

---

**Products Engineering Data Bulletin No. 10,** available from the Behr-Manning Corp., Troy, N. Y., discusses the Tongue Sander, a machine developed for sanding and polishing inside diameter work with a coated abrasive belt.

The bulletin describes the machine, its applications, and gives complete specifications. Two sheets are devoted to engineering drawings of the assembled machine and its parts for reproduction.

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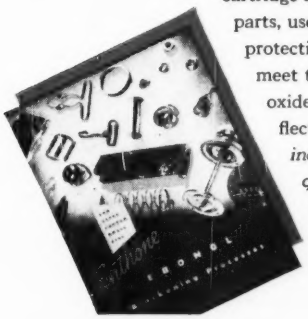
# Millions of Guns...

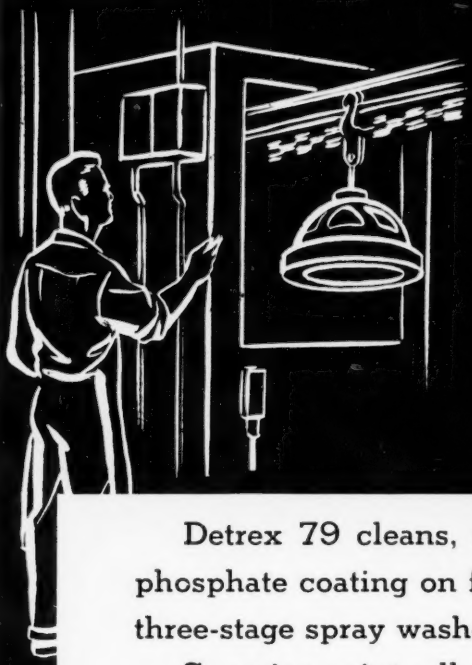
ammunition shells, cartridge clips, shoe eyelets, buckles, buttons, harness hardware, radar parts, used in World War II, received these government-approved, protective black finishes. Enthone Ebonol blackening processes meet today's Army, Navy and Air Force specifications for black oxide coatings on steel, copper, brass and zinc . . . for wear, reflectivity, saltspray, and weathering. NEW EBONOL Booklet *including detailed operating instructions, sent free on request. U.S. Patents*—2,364,993, 2,460,896, 2,460,898, 2,481,854. Canada, 463,852.




## Enthone inc

442 ELM STREET NEW HAVEN CONN

## Complete Cleaning Here



## Cuts Rejects Here

Detrex 79 cleans, as well as produces a fine phosphate coating on ferrous parts in any two- or three-stage spray washer.

Superior paint adhesion is thus obtained.

The solution life of 79 is exceptionally long, and make-up additions are very low.

There is also a Detrex compound for every other cleaning application — in spray washers, soak tanks, and electrolytic. Explain your cleaning requirements to a Detrex representative. He will assume responsibility for better production cleaning.

# DETREX

BOX 501, DETROIT 32, MICH. *Corporation*